THE UNIVERSITY OF THE WEST INDIES, ST. AUGUSTINE CAMPUS
COURSE OUTLINE

COURSE TITLE: Statistical Methods

COURSE CODE: ECON2025

LEVEL: I

SEMESTER: II

CREDITS: 3

PREREQUISITES: ECON 1000; ECON 1002; ECON 1003 and ECON 1005

DEPARTMENT: ECONOMICS

INSTRUCTOR INFORMATION:

Lecturer (PT): Mr. Don Bethelmie
Email Address: don.bethelmie@sta.uwi.edu
Room Number: tba
Office Telephone: tba

REQUIRED TEXT(S)

TBA

HIGHLY RECOMMENDED READING

TBA
LETTER TO THE STUDENT

Welcome to Statistical Methods.

This course will be delivered with the support of a Myelarning Website. The Website should be visited frequently by each student to access Tutorial Registration; Course Lecture Notes; Forum Messages from the Lecturers; Coursework Grades; Tutorial Assignments; Online Quizzes; Links to videocasts; Past Examination Papers and Course Notices.

You are reminded that quantitative courses such as Statistical Methods require a mix of learning approaches. You will be required to read the lecture materials from one of the course texts/materials prior to the lecture, complete the online quiz; participate in the in-class discussion of that material and supplement both these activities with a second reading and group discussion of the course texts and related materials provided via links on the course website. Such reading and discussion must be followed by the solving of problems on the tutorial assignments.

Remember to apply yourself consistently from the first week.

EXPECTATIONS

As a student enrolled in Statistical Methods, your lecturer and tutor expect that you will be fully engaged in the traditional classroom, the cooperative learning activities and all online activities. Research has shown that students learn best through collaboration and interaction; accordingly, you are encouraged to participate in and complete all assignments and classroom activities.

COURSE DESCRIPTION:

Modern economists, functioning in the emerging global environment (an environment in which information is a competitive resource) are expected to have a varied toolkit of techniques to provide relevant economic analysis and forecasts to both the private and public sectors. The development of this toolkit requires both a sound grasp of the theory and application of statistical methods. This course is intended to build on the knowledge of the theory of statistics gained at the firstyear level as well as furnish the student with the fundamentals to attempt more advanced work.

The course is divided into two (2) parts.

1. Theoretical concepts of Probability, Random Variables and Probability Distributions with some emphasis on practical applications. These topics will normally be covered in an introductory course in Mathematical Statistics.
2. Inferential Statistics that every economist or economic statistician will encounter on a routine basis in research and in the world of work viz. Estimation, Tests of Hypotheses, Time Series Analysis, and Introductory Econometrics.

COURSE GOALS

The goals of this course are:

a. To familiarize Level II students with the interpretation and use of basic statistical data, symbols and terminology utilized in Statistical Methods

b. To enhance the student’s knowledge and application of the concepts of Probability, Random Variables and Probability Distributions

c. To enhance the student’s knowledge and application of Inferential Statistics

d. To build students’ competence in the application of logic, the selection of appropriate statistical methods and the interpretation of results of statistical analysis in any given problem solving situation.

COURSE OBJECTIVES/COMPETENCIES

At the end of this course students will be expected to:

- Compute probabilities by applying the Laws of Probability, Chebyshev’s Inequality, Bayes Rule and the Theory of either Discrete or Continuous Probability Distributions
- Perform Point and Interval Estimation for population means, population variances, and population proportions
- Test hypotheses involving population means, population variances, and population proportions based on sample data provided
- Decompose a Time Series and forecast the value of a variable based on the time series data provided
- Interrogate and interpret the output of statistical software packages such as MINITAB with a view to making decisions as to the fit of a range of models to a sample dataset
- Organise and analyse a dataset and present findings with support from Microsoft Office.

OUTLINE OF COURSE CONTENT

This course is organized into two (2) sections; these parts cover a total of units (6) units. The first part focuses on theoretical concepts and applications of Probability and Probability Distributions. The second part focuses on theoretical concepts and

The course is organized into six (6) units; the content of these units is defined below.

**PART A – PROBABILITY, RANDOM VARIABLES & PROBABILITY DISTRIBUTIONS**

**II. NATURE & SCOPE OF STATISTICS AND A REVIEW OF STATISTICAL CONCEPTS**

Meaning of Statistics; Stages of Statistical Investigation: Statistical Definition of the Decision Problem: Populations, Elementary Units and Observations; Measurement of Elementary Units; Specifying Parameters; Sample Space; Axioms of Probability; Random Variables- Discrete and Continuous; Statistical Dependence and Independence; Marginal and Conditional Probability; Permutations and Combinations, Chebyshev's Inequality.

*References: Keller & Warrack or Mann for discussion of the concepts and Rothenberg for further discussion, illustrations and solved examples.*

**III. FUNDAMENTALS OF PROBABILITY THEORY AND PROBABILITY DISTRIBUTIONS**

Discrete and Continuous Probability Distributions; Cumulative Distribution Functions; Moments of a Distribution; Mathematical Expectation; Marginal and Conditional Distributions; Density Functions of well known distributions: Bernoulli, Binomial, Poisson, Uniform, and Normal.

*References: Keller & Warrack or Mann for discussion of the concepts, Rothenberg for further discussion, illustrations and solved examples. Paulson/Bellhouse for some interesting applications to lotteries.*

**PART B – SURVEY SAMPLING, ESTIMATION, TESTS OF HYPOTHESIS, SIMPLE REGRESSION, INTRODUCTORY ECONOMETRICS CONCEPTS; TIME SERIES**

**IV. STATISTICAL INFERENACE**

Random Samples and Sampling Distributions; Sample Moments; \( \chi^2 \), Student-t and F distributions; Central Limit Theorem. Point and Interval Estimation; Confidence Intervals; Maximum likelihood Estimation; Properties of Estimators: - Unbiasedness, Efficiency, Consistency, Sufficiency. Principles of Estimation. The notion of a statistical test; Tests of Simple and Composite Hypotheses; Tests of Population Mean, Population Variance, Population Proportion, Difference of Population Means and Ratio of
Population Variances.

References: Walpole Chaps 8, 9 and 10, Keller & Warrack or Mann for discussion of the concepts for statistical concepts and Tanis/Rothenberg for further discussion, illustrations and solved examples.

V. SURVEY METHODOLOGY AND ANALYSIS OF VARIANCE

The Process of Sampling; Survey Design and Implementation; Sampling Methods (i.e. Simple Random Sampling, Cluster Sampling, Stratified Random Sampling, Multi Stage Sampling); Contingency Table Analysis; Analysis of Variance (Completely Randomized One-way and Two-way Models); Link between Regression Analysis and ANOVA.


VI. INTRODUCTION TO ECONOMETRICS

Simple Regression Analysis; Multiple Regression Analysis and Introductory Econometric Concepts


VII. TIME SERIES AND FORECASTING METHODS

Simple Exponential Smoothing; Double Exponential Smoothing; Moving Averages; Seasonality and Seasonal Adjustment of Economic Time Series (Ratio to Moving Averages).

<table>
<thead>
<tr>
<th>Week</th>
<th>Activity</th>
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<tbody>
<tr>
<td>1</td>
<td>Sept. 01 – 07 Registration; Orientation</td>
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<tr>
<td>2</td>
<td>Sept 08 – Sept 14 Begin of Unit 1; (Probability Theory &amp; Bayes Theorem)</td>
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<td>3</td>
<td>Sept. 15 – 21 Lecture on Unit 2; Tutorial; (Probability Distribution); Online Quiz on Unit 1</td>
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<tr>
<td>4</td>
<td>Sept. 22 – Sept. 28 Lecture on Unit 2; Tutorial; (Probability Distribution); Online Quiz on Unit 2</td>
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<tr>
<td>5</td>
<td>Sept. 29– Oct. 05 Lecture on Unit 3; In-Class Test I (Probability Theory and Distribution)</td>
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<td>6</td>
<td>Oct. 06 – Oct. 12 Lecture on Unit 3; Tutorial;</td>
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<td>7</td>
<td>Oct. 13 – Oct. 19 Lecture on Unit 3; Tutorial; (OUT FOR THE FEAST)</td>
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<tr>
<td>8</td>
<td>Oct. 20 – Oct. 26 Lecture on Unit 4; Tutorial; (ANOVA) Online Quiz on Unit 3</td>
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<tr>
<td>9</td>
<td>Oct. 27 – Nov. 02 Lecture on Unit 4; Tutorial; In-Class Test II (Estimation)</td>
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<tr>
<td>10</td>
<td>Nov. 03 – Nov. 09 Lecture On Unit 6; Tutorial; (Introduction to Econometrics).</td>
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<td>11</td>
<td>Nov. 10 – Nov. 16 Lecture on Unit 6; Tutorial; (Introduction to Econometrics).</td>
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<tr>
<td>12</td>
<td>Nov. 17 – Nov. 23 Lecture on Unit 6; Tutorial; (Introduction to Econometrics). REVISION; Online Quiz on Unit 4 and 6</td>
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<tr>
<td>13</td>
<td>Nov. 24 – Nov. 29 REVISION; END OF TEACHING; Tutorial</td>
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</table>

**TEACHING STRATEGIES**

The course will be delivered by way of lecture discussion, in-class problem solving activities, weekly tutorials, graded pre-class online quizzes, in-class tests, other graded activities on Myelearning, and consultation during office hours.

Attendance at all Lectures and Tutorial Classes will be treated as **compulsory**. **University Regulation #19** allows for the Course Lecturer to debar from the Final Examination students who did not attend at least 75% of tutorials. The Course Lecturers will be enforcing this regulation.

Basic courtesy requires that students approach Lecturers and Tutorials in advance of missing a lecture or tutorial and indicate the nature of their situation so that appropriate
adjustments can be negotiated. In the event, that advance notice of absence from lecture or tutorial is not possible, students are expected to do so before the class of the week immediately after the absence.

The practice of students waiting until the publication of the Debarred List to bring to the attention of the Tutor, Lecturer and Head of Department reasons for their absence from tutorials will be discouraged.

Students will be provided with a minimum of three (3) contact hours weekly; two (2) for lectures and one (1) for tutorials. Registration for tutorial classes will be from September 03\textsuperscript{th} – 17\textsuperscript{th}. Tutorials are expected to begin in the week of September 15\textsuperscript{th} – 21\textsuperscript{st}.

In addition, the Course Lecturers will be available for consultations during specified Office Hours and at other times by appointment.

Participation in class discussion and problem solving activities is a critical input to the feedback process within a lecture or tutorial. The rules of engagement for these discussions will be defined by the Course Lecturer and/or Tutor at the first lecture and first tutorial respectively.

**IN COURSE ASSIGNMENTS**

Students will be required to register for a tutorial class/group by September 14, 2019. Each Tutorial Class/Group will consist of no more than 20 students.

Tutorial assignments are designed to help students flesh out concepts and practice the application of the logic and concepts to a range of problem situations. These are important in this course since they provide the basis for formal practice and assist in reinforcing the concepts introduced in lectures. It is expected that students will also use the texts and recommended references. Every effort should be made to complete each tutorial sheet within the time period indicated on the sheet.

Students are advised to read through each tutorial assignment to identify the concepts required for its solution prior to revising the concepts so identified; it is only after such revision that you should proceed to attempt the solutions. Some questions in an assignment sheet will be solved in one attempt; others will require more than one attempt. Students are encouraged to adopt co-operative learning approaches (i.e. working with another student or students) to solve the more challenging questions in the tutorial sheet.

If after the individual effort and the co-operative learning effort, the student feels challenged by a question(s), he/she owes it to himself/herself to seek out the Course Lecturer or Tutor for guidance and assistance.

Under no condition should a student come to a tutorial class unprepared to contribute to the class proceedings.
Overall students should invest a minimum of seven (7) hours per week apart from lectures, tutorial classes and office hours to this course.

**ASSESSMENT STRATEGY**

Assessment Objectives are linked to the Course Objectives. The approach to be adopted for assessment in this course has three (3) objectives:

a. to effectively measure the students’ proficiency in interpreting and using the statistical concepts, symbols and terminology in the three parts of the course

b. to effectively measure the students’ proficiency in recognising from within the three parts of the course the appropriate mix of statistical concepts and methods required for addressing a range of economic problems

c. to effectively measure the students’ ability to apply the appropriate mix of statistical methods from the three parts of the course in a logical manner.

Assessment will take the form of Coursework and a Final Examination. The Coursework Component is comprised of Online Quizzes, Graded In-Class Tests/exams, In Class group assignments and ONE Mini Group Project.

Students will be continuously assessed by way of Two (2) In-Class. The questions that comprise each test will be based on the topics covered in the lectures over the previous weeks and the tutorial assignment. Solutions to each in-class test will be posted on the course website.

At least three online quizzes will be administered, approximately one per month. All reports of technical glitches experienced by students during an online quiz must be reported for the course.

There will be at least four in-class group assignment that will be administered during the semester. The take exams will cover units all units.

Students will be required to complete a group project based on topics covered in Units one and two. The due date for the project assignment will be announced.

The Final Examination at the end of the Semester will be based on Parts B and C of the course. Students must be able to demonstrate the Learning Outcomes of the course during the examination. The examination will be of two-hour duration.

Students are strongly advised to familiarize themselves during Week 1 of the Semester with the University Regulations on Examination Irregularities particularly in so far as these regulations relate to Cheating during coursework assessment activities and/or the final examination. The Lecturers will apply these regulations to students determined to have cheated during any of the coursework activities.
The **Overall Mark** in the course will therefore be a composite of the marks obtained in the coursework and final examination components; the relative weights being:

Coursework 40%
- Online Quizzes 5%
- 2 Graded In-Class Tests 25%
- 4 In Class group 5%
- Group Project 5%

Final Examination 60%

Final grades will be awarded as shown in the Table below.

### From the Board for Undergraduate Studies (October 2013)

<table>
<thead>
<tr>
<th>Grade</th>
<th>% Range</th>
<th>Grade Point</th>
<th>Grade Definition</th>
<th>Grade Descriptor</th>
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<tbody>
<tr>
<td>A+</td>
<td>90 -100</td>
<td>4.3</td>
<td>Exceptional</td>
<td>Demonstrates exceptional performance and achievement in all aspects of the course. Exceptional application of theoretical and technical knowledge that demonstrates achievement of the learning outcomes. Goes beyond the material in the course and displays exceptional aptitude in solving complex issues identified. Achieves the highest level of critical, compelling, coherent and concise argument or solutions within the course.</td>
</tr>
<tr>
<td>A</td>
<td>80 – 89</td>
<td>4.0</td>
<td>Outstanding</td>
<td>Demonstrates outstanding integration of a full range of appropriate principles, theories, evidence and techniques. Displays innovative and/or insightful responses. Goes beyond the material with outstanding conceptualization which is original, innovative and/or insightful. Applies outstanding critical thinking skills</td>
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<tr>
<td>A-</td>
<td>75 - 79</td>
<td>3.7</td>
<td>Excellent</td>
<td>Demonstrates excellent breadth of knowledge, skills and competencies and presents these in appropriate forms using a wide range of resources. Demonstrates excellent evidence of original thought, strong analytical and critical abilities; excellent organizational, rhetorical and presentational skills.</td>
</tr>
<tr>
<td>B+</td>
<td>70 -74</td>
<td>3.3</td>
<td>Very Good</td>
<td>Demonstrates evidence of very good critical and analytical thinking in most aspects of the course. Very good knowledge that is comprehensive, accurate and relevant. Very good insight into the material and very good use of a range of appropriate resources. Consistently applies very good theoretical and technical knowledge to achieve the desired learning outcomes.</td>
</tr>
<tr>
<td>B</td>
<td>65 - 69</td>
<td>3.0</td>
<td>Good</td>
<td>Demonstrates good knowledge, rhetorical and organizational skills. Good insight into the material and a good use of a range of appropriate resources. Good integration of a range of principles, techniques, theories and evidence.</td>
</tr>
<tr>
<td>B-</td>
<td>60 -64</td>
<td>2.7</td>
<td>Satisfactory</td>
<td>Displays satisfactory evidence of the application of theoretical and technical knowledge to achieve the desired learning outcomes. Demonstrates sound organisational and rhetorical skills.</td>
</tr>
<tr>
<td>C+</td>
<td>55 -59</td>
<td>2.3</td>
<td>Fair</td>
<td>Demonstrates fair breadth and depth of knowledge of main components of the subject. Fair evidence of being able to assemble some of the appropriate principles, theories, evidence and techniques and to apply some critical thinking.</td>
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<tr>
<td>Grade</td>
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<td>Grade Point</td>
<td>Grade Definition</td>
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<tr>
<td>C</td>
<td>50 - 54</td>
<td>2.0</td>
<td>Acceptable</td>
<td>Demonstrates acceptable application of theoretical and technical knowledge to achieve the minimum learning outcomes required in the course. Displays acceptable evidence of critical thinking and the ability to link theory to application.</td>
</tr>
<tr>
<td>FB</td>
<td>35 - 49</td>
<td>1.3</td>
<td>Unsatisfactory</td>
<td>Demonstrates unsatisfactory application of theoretical and technical knowledge and understanding of the subject. Displays unsatisfactory ability to put theory into practice; weak theoretical and reflective insight. Unsatisfactory critical thinking, organizational and rhetorical skills.</td>
</tr>
<tr>
<td>F</td>
<td>0 - 34</td>
<td>0</td>
<td>Poor</td>
<td>Overall poor or minimal evidence of knowledge and understanding of the subject. Displays little ability to put theory into practice; lacks theoretical and reflective insights. Incomplete breadth and depth of knowledge on substantive elements of the subject. Little or no evidence of critical engagement with the material. Responses are affected by irrelevant sources of information, poor organizational and rhetorical skills.</td>
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**COURSE EVALUATION**

At the end of each unit and at the mid-point of the course, the lecturer will solicit feedback on how the information is being processed and the course in general. The feedback will be used to make improvements, correct errors, and try to address the students’ needs. Additionally, at the end of the course, the CETL will evaluate the course, so it is important that you are in attendance during that time.

**CLASS ATTENDANCE POLICY**

Regular class attendance is essential. A student who misses a class will be held responsible for the class content and for securing material distributed. Attendance is the responsibility of the student and consequently nonattendance will be recorded. Students would be reminded of the implications of non-responsible attendance.

**EXAMINATION POLICY**

Students are required to submit coursework by the prescribed date. Coursework will only be accepted after the deadline, in extenuating circumstances, with the specific written authority of the course lecturer and in any event, not later than the day before the start of the relevant end of semester examinations of the semester in which the particular course is being offered.

Please review the handbook on *Examination Regulations for First Degrees, Associate Degrees, Diplomas, and Certificates* available via the Intranet.

**POLICY REGARDING CHEATING**

Academic dishonesty including cheating is not permitted. For more information, read Section V (b) Cheating in the *Examination Regulations for First Degrees, Associate Degrees, Diplomas, and Certificates* online via the Intranet.
STATEMENT ON DISABILITY PROCEDURE

The University of the West Indies at St. Augustine is committed to providing an educational environment that is accessible to all students, while maintaining academic standards. In accordance with this policy, students in need of accommodations due to a disability should contact the Academic Advising/Disabilities Liaison Unit (AADLU) for verification and determination as soon as possible after admission to the University, or at the beginning of each semester.

POLICY REGARDING INCOMPLETE GRADES

Incomplete grades will only be designated in accordance with the University’s Incomplete Grade Policy.

OTHER RESOURCES

Probability and Statistical Inference


Websites:
www.stattrek.com
www.mathworld.wolfram.com
www.zweigmedia.com
www.wyzant.com
www.math.uiac.edu/~hildebr/370/370jointdistributions.pdf
www.math.arizona.edu/~ghystad/chapter6math362.pdf

Survey Methodology


Abdulah N. (1986): *Designing Social Surveys in the Caribbean*, St. Augustine ISER


*Introduction to Econometrics*


Shelton Nicholls, Hyginus Leon and Patrick Watson (eds) Problems and Challenges in Modelling and Forecasting Caribbean Economies, St. Augustine: Caribbean Centre for Monetary Studies (CCMS).***


**Time Series and Forecasting Methods**


Clarke C. and M. Francis (1996) “Seasonal Adjustment Systems for Practitioners in the Caribbean: Lessons from the Trinidad and Tobago Experience” in Shelton Nicholls, Hyginus Leon and Patrick Watson (eds) Problems and Challenges in Modelling and Forecasting Caribbean Economies, St. Augustine: Caribbean Centre for Monetary Studies (CCMS).*** HC 151 P758 1996 WEST INDIANA LOAN SECTION


September 2016