COURSE OUTLINE : ECON 127
D Credit – Degree Applicable
COURSE ID 010510
Cyclical Review: February 2020
Revision: October 2021

COURSE DISCIPLINE : ECON

COURSE NUMBER : 127

COURSE TITLE (FULL) : Introductory Statistics for Economics and Business

COURSE TITLE (SHORT) : Introductory Statistics for Economics and Business

ACADEMIC SENATE DISCIPLINE: Economics

CATALOG DESCRIPTION

ECON 127 is a one-semester course designed for economics, business, and social sciences students whose major requires a course in statistics. Topics in this course include the nature of statistical methods, types of data, introductory probability, sampling theory, experimental design, confidence intervals, hypothesis testing, regression analysis, and decision making. Emphasis is placed on the application of statistical concepts to economic, business and social science data, the development of statistical reasoning, and the interpretation of results in an economic, business, or social science context.

CATALOG NOTES

This course may not be taken for credit by students who have successfully completed MATH 136.

Total Lecture Units:4.00

Total Laboratory Units: 0.00

Total Course Units: 4.00

Total Lecture Hours:72.00

Total Laboratory Hours: 0.00

Total Laboratory Hours To Be Arranged: 0.00

Total Contact Hours: 72.00

Total Out-of-Class Hours: 144.00

Recommended Preparation: MATH 30 or MATH 90 and ECON 101 or ECON 102.

ENTRY STANDARDS

	Subject	Number	Title	Description	Include
1	MATH	30	Intermediate Algebra and Pre-Statistics	Solve equations with one radical;	Yes
2	MATH	30	Intermediate Algebra and Pre-Statistics	solve absolute value equations and inequalities;	Yes
3	MATH	30	Intermediate Algebra and Pre-Statistics	solve linear equations and inequalities;	Yes
4	MATH	30	Intermediate Algebra and Pre-Statistics	find the equation of a line and interpret the slope and intercept;	Yes
5	MATH	30	Intermediate Algebra and Pre-Statistics	solve applied problems;	Yes
6	MATH	30	Intermediate Algebra and Pre-Statistics	solve equations with one logarithmic or exponential expression;	Yes
7	MATH	30	Intermediate Algebra and Pre-Statistics	graph functions (linear, exponential, logarithmic);	Yes
8	MATH	30	Intermediate Algebra and Pre-Statistics	compute basic statistics for a variable, including mean, median, mode, quartiles, range, variance and standard deviation;	Yes
9	MATH	30	Intermediate Algebra and Pre-Statistics	describe the distribution of a quantitative variable in terms of its shape, center and spread, using graphical techniques;	Yes
10	MATH	30	Intermediate Algebra and Pre-Statistics	apply addition and multiplication rules of probability in problem solving including computing expected value;	Yes
11	MATH	30	Intermediate Algebra and Pre-Statistics	identify probability models and compute their areas;	Yes
12	MATH	30	Intermediate Algebra and Pre-Statistics	graph and interpret bivariate data through the use of scatterplots, regression, and correlation;	Yes
13	MATH	90	Intermediate Algebra for BSTEM	solve absolute value equations and inequalities;	Yes
14	MATH	90	Intermediate Algebra for BSTEM	solve linear equations and compound inequalities;	Yes

15	MATH	90	Intermediate Algebra for BSTEM	perform operations with polynomials;	Yes
16	MATH	90	Intermediate Algebra for BSTEM	simplify complex fractions;	Yes
17	MATH	90	Intermediate Algebra for BSTEM	perform operations with radical expressions;	Yes
18	MATH	90	Intermediate Algebra for BSTEM	simplify expressions with rational exponents;	Yes
19	MATH	90	Intermediate Algebra for BSTEM	solve rational equations;	Yes
20	MATH	90	Intermediate Algebra for BSTEM	solve equations with radicals;	Yes
21	MATH	90	Intermediate Algebra for BSTEM	find the equation of a line parallel or perpendicular to a given line;	Yes
22	MATH	90	Intermediate Algebra for BSTEM	solve a system of linear equations using elimination substitution;	Yes
23	MATH	90	Intermediate Algebra for BSTEM	solve systems of linear inequalities;	Yes
24	MATH	90	Intermediate Algebra for BSTEM	solve quadratic equations with real and complex solutions;	Yes
25	MATH	90	Intermediate Algebra for BSTEM	find the composition of two functions;	Yes
26	MATH	90	Intermediate Algebra for BSTEM	solve applied problems;	Yes
27	MATH	90	Intermediate Algebra for BSTEM	find the inverse of a function;	Yes
28	MATH	90	Intermediate Algebra for BSTEM	use the properties of logarithms to simplify and expand expressions;	Yes
29	MATH	90	Intermediate Algebra for BSTEM	solve logarithmic and exponential equations;	Yes
30	MATH	90	Intermediate Algebra for BSTEM	graph functions (linear, quadratic, exponential, logarithmic);	Yes

31	MATH	90	Intermediate Algebra for BSTEM	graph parabolas and circles centered at any point.	Yes
32	ECON	101	Principles of Microeconomics	calculate and interpret measures of elasticity;	Yes
33	ECON	101	Principles of Microeconomics	analyze production and costs of the firm;	Yes
34	ECON	102	Principles Of Macroeconomics	Identify and interpret macroeconomic data;	Yes
35	ECON	102	Principles Of Macroeconomics	apply macroeconomic models to understand the economy;	Yes

EXIT STANDARDS

1 Describe and analyze realistic data sets both large and small from disciplines including economics, business, psychology, and other social sciences using graphs and statistics;
2 analyze real world results from economics, business, and related fields, and interpret the output of a technology-based statistical analysis and identify flaws in statistical reasoning;
3 identify the standard methods of obtaining economics and business data and identify advantages and disadvantages of each;
4 calculate probability using the normal distribution, the t distribution and the basic laws of probability;
5 describe sampling distributions, distinguish them from population distributions and analyze the role played by the Central Limit Theorem;
6 compute confidence intervals of population means, proportions and standard deviations from economics and business data;
7 identify the basic concept of hypothesis testing including Type I and II errors, finding and interpreting levels of significance including p-values, selecting the appropriate techniques for testing a hypothesis from one and two populations and interpreting the result from economics and business data;
8 perform chi-square tests using chi-square tables and statistical software or calculator;
9 use linear regression and ANOVA analysis for estimation and inference, and interpret the economics and business statistics;
10 calculate and present results using sound statistical reasoning, accurate statistical terminology and software such as Excel, R, or Stata.

STUDENT LEARNING OUTCOMES

1 perform regression analysis to make informed predictions about the relationships between quantitative variables that pertain to economic, business, and social science data;
2 apply confidence intervals and hypothesis testing, such as Z-test, t-test, Chi-square, ANOVA and regression, to form conclusions about economic, business, and social science data.

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COURSE CONTENT WITH INSTRUCTIONAL HOURS

	Description	Lecture	Lab	Total Hours
1	Introduction to Statistics and the Organization of Data • General nature of statistics, basic concepts and definitions, such as population, sample, census, elements, variables and observations • Economic, business, and social science data sources • Navigating economic, business, and social science data sources • Application of statistics in economics, business, and other social sciences • Randomized and natural experiments in economics, business, and other social sciences • Applications in economics, business, and other social sciences using Big Data • Introduction to statistical software programs such as Excel, R, or Stata • Quantitative and categorical economic, business, and social science variables	6	0	6
2	Descriptive Statistics of Economic, Business, and Social Science Data • Tables and graphs • Frequency distributions • Measures of central tendency ◦ Mean, median and mode • Measures of spread ◦ Percentiles and quartiles ◦ Range, variance and standard deviation	6	0	6
3	Comparisons of Two Variables • Cross-tabulations for categorical economic, business, and other social science variables • Covariance and correlation coefficients for quantitative economic, business, and other social science variables	2	0	2

4	Discrete and Continuous Random Variables and Probability Distributions • Expected value, variance and standard deviation • Binomial distribution • Other discrete distributions (for example, discrete uniform distribution, Poisson distribution and/or hypergeometric distribution) • Calculating probabilities for discrete probability distributions • Expected value, variance and standard deviation • Contrasts between discrete and continuous probability distributions • Probability density functions (PDFs) • Uniform distribution • Normal distribution and the normal approximation to the binomial distribution • Other continuous distributions (for example, exponential distribution) • Calculating probabilities using continuous probability distributions	8	0	8
5	Sampling Distributions and the Central Limit Theorem • Variance, expected value and distribution of the sample mean of a quantitative variable that is random • Variance, expected value and distribution of the sample proportion of a categorical random variable	4	0	4
6	Methods of Selecting Samples, Point Estimation, and Confidence Intervals • Simple random sampling • Other sampling methods, such as stratified random sampling, systematic sampling, cluster sampling, convenience sampling, judgment sampling and the advantages and disadvantages of each sampling method • Applications of sampling methods in economics, business, and other social sciences • Confidence intervals for the population proportion and mean	6	0	6

7	Hypothesis Testing • Developing appropriate hypotheses pertaining to applications in economics, business, and the social sciences • Type I and Type II errors • One-tailed and two-tailed tests • Hypothesis tests for the population mean using the normal distribution and the t distribution • Hypothesis tests for the population proportion • Hypothesis tests for the difference between two population means using t-tests • Hypothesis tests for the difference between two population proportions • Chi-squared tests for non-parametric statistics • Determination and interpretation of levels of statistical significance including p-values	6	0	6
8	Simple Linear Regression using Ordinary Least Squares (OLS) • Simple linear regression model involving variables pertaining to economics, business, and the social sciences • Independent and dependent variables • Interpretation of the regression equation • Hypothesis tests for the results of the regression analysis • Using t statistics • Using ANOVA and the F statistic • R-squared and correlation coefficients • Assumptions of the regression model • Residual analysis • Economic, business, and social science interpretation of regression results • Applying linear regression models in economics, business, and social science research	8	0	8

9	Application of Statistical Analysis for Economics, Business, and Other Social Sciences • Correlation vs. causation • Reverse causality • Omitted variable bias • Observational and experimental studies in economics, business, and the social sciences • Interpretation of statistical results to facilitate decision-making in economics, business, and other social sciences	12	0	12
10	Computer Technology and Statistics • Performing basic statistical analysis, such as descriptive statistics, confidence intervals, hypothesis tests and simple linear regression using statistical software such as Excel, R, or Stata • Implications of recent trends, including Big Data, on statistical analysis for economics, business, and other social sciences	10	0	10
11	Statistics and Public Policy Debates • Review of recent statistical research on public policies pertaining to economics, business, and other social sciences • Statistical controversies in public policy debates	4	0	4
				72

OUT OF CLASS ASSIGNMENTS

1 projects involving analysis of real-world data using statistical software (e.g., collect data and create a written report including graphical displays and numeric summaries);
2 short essays demonstrating application of concepts and critical thinking skills (e.g., analyze data sets and write a short report).

METHODS OF EVALUATION

1 four-to-five chapter exams
2 student presentations or projects (e.g., presentation of a statistical analysis using data applicable to economics, business, and social science issues);
3 final examination testing problem solving.

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METHODS OF INSTRUCTION

- [x] Lecture
- [ ] Laboratory
- [ ] Studio
- [x] Discussion
- [x] Multimedia
- [x] Tutorial
- [x] Independent Study
- [x] Collaboratory Learning
- [x] Demonstration
- [x] Field Activities (Trips)
- [x] Guest Speakers
- [x] Presentations

TEXTBOOKS

Title	Type	Publisher	Edition	Medium	Author	IBSN	Date
Essentials of Statistics for Business and Economics	Required	Cengage	9	Print	Anderson, David R.	978-035704543 5	2019