INSTRUCTOR'S OR COURSE COORDINATOR'S NAME:	Luceny Guzmán – Gina Galindo – Santiago Nieto – Esneider González		
DEPARTMENT:	Industrial Engineering		
COURSE NAME:	Data Analysis in Engineering I		
COURSE CODE:	EST 7042		
CREDITS:	4		
CONTACT HOURS:	3 hours of lecture and 2 hours of practical work per week		
TYPE OF COURSE:	**Required course** ☒	**Elective course** ▢	**Selected Elective** ▢
PRE REQUISITES:	MAT 1111		
CO REQUISITES:	-		

DESCRIPTION – COURSE CATALOG
This course focuses on statistical tools and methods necessary for the characterization and modeling of business processes (for the production of both physical goods and services). It will cover topics such as: Graphical and quantitative analysis of data, probability, random variables, probability distributions, some discrete and continuous distribution functions, behavioral patterns of processes, tools for parameter estimation and methods of statistical comparison.

BIBLIOGRAPHICAL REFERENCES: text book, other supplemental materials		
Title	**Author**	**Year**
Statistics for Engineering and the Sciences	Mendenhall W, Sincich T.	2007
Probability & Statistics for Engineers & Scientists	Walpole R.	2006
Engineering Statistics	Montgomery D, Runger G, Wiley J.	2003
Probabilidad y Estadística	Morris H,	1988
Estadística	Weimer R. Ramírez A	1998

COURSE LEARNING OUTCOMES
After completing the course, the student must be able to: I. Identify variables of interest associated with processes of counting and measuring, in order to conduct its statistical analysis, and organize, analyze, characterize and construct different types of graphics. II. Extract information from grouped qualitative and quantitative data sets. III. Calculate and interpret each one of the measures of central tendency, position and variability from an ungrouped data and be able to use it for decision making. IV. Calculate the probability of an event using different techniques such as counting techniques (permutations and combinations), probability axioms, conditional probability and independent events and/or Bayes theorem.

V.	Determine the probability distribution of a discrete random variable in order to use it for decision making.
VI.	Use the density or distribution function of a continuous random variable for decision making processes.
VII.	Apply the properties of expected value and variance for decision making processes.
VIII.	Model a discrete or continuous random variable associated experiment using various probability distributions.
IX.	Use joint probability distributions for decision making processes.
X.	Use the appropriate sampling distribution to calculate associated probabilities and make inference about the parameters of one or two populations.
XI.	Given a statement about the parameters of one or two populations, use estimation to determine whether it is true or false.
XII.	Given a statement about the parameters of one or two populations, use hypothesis testing to determine whether it is true or false.
XIII.	Given a set of either discrete or continuous data, fit it to a specific probability distribution, using the Chi-squared test.
XIV.	Given an independent and dependent variable, determine if it is possible to fit it to a linear regression model, after verifying the normality, constant variance and linearity assumptions.
XV.	Find a regression model to generate point estimations, confidence and prediction intervals.
XVI.	Use statistical software to develop statistical techniques such as descriptive analysis, estimation, hypothesis testing, regression models, and factorial analysis, among others.

RELATIONSHIP OF COURSE TO STUDENTS OUTCOMES										
a	b	c	d	e	d	g	h	i	j	k
x	x			x		x				

TOPICS COVERED				
No.	**TOPIC**	**HOURS CLASS**	**HOURS LAB.**	**WEEKS NUMBER**
1	Descriptive statistics: Basic concepts of statistics. The role of statistics in Engineering and Science. Descriptive and inferential statistics.	4	1	1
2	Probability: Basic concepts. Definition of probability axioms. Counting techniques (permutations and combinations). Conditional probability and independent events. Bayes theorem.	10	5	2-4
3	Probability distributions: Discrete and random variables and its probability distributions. Expected value and	10	5	5-7

	variance. Discrete and continuous probability distributions.			
4	Sampling Distribution: Basic concepts. Distributions related to the normal distribution. Sampling distribution of mean and proportion.	6	4	8-9
5	Estimation: Point estimation. Interval estimation. Confidence and prediction intervals.	6	4	10-11
6	Hypothesis Testing: General concepts. Hypothesis tests. Chi-squared test. P values.	12	5	12-14
7	Linear simple Regression: Parameters estimation. Variance analysis. Validation of assumptions. Prediction of new observations. Confidence and prediction intervals.	6	2	14-15