

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE OUTLINE TEMPLATE			
Course Title	Data Analytics		
Course Code	PR651	No. of Credits	4
Department	Production Engineering	Faculty	Dr. Mubarak Ali
Pre-requisites Course Code	Basic Engineering and Statistics		
Course Coordinator(s) (if, applicable)	-		
Course Faculty E-mail	mubarak@nitt.edu	Telephone No.	7012800442
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
COURSE OVERVIEW			
<p>Complexities in explanation of a social or physical phenomenon requires engineers and researchers to gather and analyze data on many different variables. This course is specifically intended to be a course in general multivariate statistical methods. It requires prior experience with inferential statistics up through analysis of variance and multiple regression.</p> <p>The need to understand the relationships between many variables makes multivariate analysis an inherently difficult subject. Often, the human mind is overwhelmed by the sheer bulk of the data. Additionally, more mathematics is required to derive multivariate statistical techniques for making inferences than in an univariate analysis.</p> <p>This course will introduce several useful multivariate techniques in a clear manner, making heavy use of illustrative example and mathematics.</p>			
COURSE OBJECTIVES			
<p>The objective of this course is</p> <ol style="list-style-type: none"> 1. To enable the students to understand and gain competence in fundamentals of descriptive and inferential statistics and to use them to solve engineering problems. 2. To inculcate the predict the relationship between two or many variables simultaneously 3. To enable the students to understand the multivariate statistical techniques and use them to analyze datas with many independent and dependent variables. 			

COURSE OUTCOMES (CO)			
Course Outcomes			Aligned Programme Outcomes (PO)
<ol style="list-style-type: none"> 1. Ability to identify the most significant independent variables of the system or the process using ANOVA, ANCOVA and to analyse the main effect and interaction effects 2. Ability to analyze more than one independent variable simultaneously using MANOVA 3. Ability to determine the relationship between the independent variables and the dependent variable of the system or the process. 4. Competence to develop a regression model where the dependent variable is categorical. 5. Ability to analyse data table in which observations are described by several inter-correlated quantitative dependent variables 6. Ability to predict a categorical dependent variable by one or more continuous or binary independent variables 			PO1, PO2, PO3, PO4, PO5, PO9, PO11
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week	Topic	Mode of Delivery
1	Week 1	Introduction, Types of Data, Types of discrete and Continuous data.	Chalk and Talk / PPT
2	Week 2	Descriptive Statistics: Tabular, Graphical and Numerical Methods, Introduction to Inferential Statistics, Orthogonality, Continuous normal distribution	Chalk and Talk / PPT
3	Week 3	linear combination of variables, Sampling distribution, Hypothesis testing: one sample Z test,	Chalk and Talk / PPT
4	Week 4	Hypothesis testing of ratio of two variances, ANOVA: 2^k factorial design: 2^1 design, 2^2 design, 2^3 design, Randomization	Chalk and Talk / PPT
5	Week 5	Covariance and Correlation; Pearson and spearman correlation coefficient. Probability plots, Simple linear Regression	Chalk and Talk / PPT
6	Week 6	Multiple linear regression; Linear and Nonlinear techniques- Backward-Forward-Stepwise-Hierarchical regression-Testing interactions (2way interaction)	Chalk and Talk / PPT
7	Week 7	Analysis of Variance and Covariance (ANOVA & ANCOVA) - Multivariate Analysis of Variance and Covariance (MANOVA & MANCOVA)	Chalk and Talk / PPT

8	Week 8	Logistic regression: Regression with binary dependent variable -Simple Discriminant Analysis-Multiple	Chalk and Talk / PPT
9	Week 9	Discriminant analysis-Assessing classification accuracy- Conjoint analysis (Full profile method).	Chalk and Talk / PPT
10	Week 10	Principal Component Analysis -Factor Analysis- Orthogonal and Oblique Rotation-Factor Score Estimation	Chalk and Talk / PPT
11	Week 11	Multidimensional Scaling-Perceptual Map-Cluster Analysis (Hierarchical Vs Nonhierarchical Clustering).	Chalk and Talk / PPT
12	Week 12	Latent Variable Models an Introduction to Factor, Path, and Structural Equation Analysis- Time series data analysis (ARIMA model) – Decision tree analysis (CHAID, CART) - Introduction to Big Data Management.	Chalk and Talk / PPT

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	End of 4 th Week	60 min	25 %
2	Dexterity Assignment 1	End of 5 th Week	30 min	7 %
3	Cycle Test 2	End of 8 th Week	60 min	20 %
4	Dexterity Assignment 2	End of 9 th Week	30 min	8 %
5	End Semester Exam	End of the Semester	3 hours	40 %

ESSENTIAL READINGS :

Text books:

1. **Using Multivariate Statistics**, *Barbara G Tabachnick, Linda S Fidell*, Pearson Education, Inc., 6e, 2013.
2. **Multivariate Data Analysis**, *Joseph F Hair Jr, William C Black, Barry J Babin, Rolph E Anderson*, Pearson Education, Inc., 7e, 2010
3. **Applied Multivariate Statistical Analysis**, *Richard A Johnson, Dean W Wichern*, Prentice Hall, 6e, 2007

Reference Book:

1. **Basic Econometrics**, *Damodar N Gujarati, Dawn C Porter, Sangeetha Gunasekar*, McGraw Hill Education, 5e, 2017.
2. **Applied multiple regression/correlation analysis for the behavioral sciences**,

Jacob Cohen, Patricia Cohen, Stephen G West, Leona S Aiken, Routledge Publishing, 3e, 2013.

3. **Data Mining: Concepts and Techniques**, Jiawei Han, Micheline Kamber, Jian Pei, Morgan Kaufmann Publisher, 3e, 2011
4. **Any Other Standard Book**

COURSE EXIT SURVEY

1. Feedback from students during class committee meetings
2. Anonymous feedback through questionnaire at the end of the course
3. Students can share their feedback directly to course faculty anytime to improve the teaching-learning process

COURSE POLICY


1. Participation in the discussions is essential during the tutorial classes.
2. Strict academic disciplines have to be maintained inside the classroom.
3. Students are strongly encouraged to attend the Cycle tests and End Semester without absence. If any student is not able to attend any of the Cycle test (1, 2) due to genuine reason, the student will be permitted to attend the compensation assessment. However, the question paper for compensation assessment will be difficult and intensive.
4. Attending classes regularly and continuously is required for the students to understand the concepts.
5. Attendance will be marked in every class. Student should maintain $\geq 75\%$ attendance to get eligible to write end semester examination.
6. Those Students who do not have $\geq 75\%$ attendance will have to RE DO the course.
7. Grading would be Relative Grading.

ADDITIONAL COURSE INFORMATION

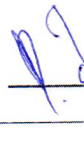
The Course Faculty is available in the department after class hours for discussions. Queries may also be emailed to the Course Faculty directly at mubarak@nitt.edu

FOR SENATE'S CONSIDERATION


Course Faculty


29/08/17

CC-Chairperson


29/8/17

HOD


29/8/17