

**JAIPURIA INSTITUTE OF MANAGEMENT**

**PGDM; TRIMESTER II; ACADEMIC YEAR 2018-19**

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| Course Code and title | **OM 201:** **Statistics for Management** |
| Credits | 3 |
| Term and Year | II Term, 2018 -19 |
| Course Requirement(s) |  |
| Course Schedule (day and time of class) | As per timetable |
| Classroom # (Location) | As per timetable |
| Course Instructor | Prof. Sonali Singh / Dr. Richa Misra / Dr. Surender Kumar |
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| Course Instructor Phone (Office) | 0120-4638300 Ext 385/332/347/330 |
| Student Consultation Hours |  |
| Office location | Second Floor  |

**Course Overview**

OM-201 is an introductory course in Decision Sciences. Business decisions are rarely made by intuitions alone. Statistics and quantitative techniques can enable managers and decision makers to analyze business situations and make informed business decisions on the basis of this analysis. The core purpose of this course is to help students to analyze different problem situations. To achieve this purpose, basic understanding and learning of tools and techniques of Statistics is important. It will be helpful in developing analytical thinking approach among students so that they may take objective decisions in their personal and professional life thereby reducing the risk of making wrong decisions. The emphasis throughout the course is on reasoning, analysis and interpretations rather than on technical details. Working knowledge of MS-Excel is pre-requisite for the course and OM-201 in itself a pre-requisite for Business Research Methods, Marketing Research and Data Analytics courses.

**Graduate Attributes (GAs), Key Differentiators (KDs), Programme Learning Outcomes (PLOs), and CLOs**

**Course Learning Outcomes (CLO)**

At the end of the course, the students should be able to:

**CLO1:** Explain and perform exploratory data analysis. **(K)**

**CLO2:** Calculate probability-estimates to represent uncertainty. **(K)**

**CLO3:** Apply sample(s) data to infer about the population. **(S)**

**CLO4:** Estimate relationship between two or more variables. **(S)**

 **Books and References**

**Text Book**

Statistics for Management, Richard I. Levin, David S. Rubin, M. H. Siddiqui, S. Rastogi, Pearson Education, Delhi, 2017, 8th Edition.

### References:

Business Statistics for Contemporary Decision Making, Ken Black, 5th Edition, Wiley India Pvt. Ltd.

Statistics for Managers Using Microsoft Excel-Levine, Stephan, Krehbiel & Berenson, 5th Edition, PHI Learning Pvt. Ltd.

Complete Business Statistics-Aczel, 6th Edition, Tata Mcgraw–Hill.

Aczel Amir D, Complete Business Statistics, Tata McGraw Hill Publishing, Company Limited, New Delhi, 2009, 6th Edition.

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**. Session Plan**

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| **Session** | **Topic/ Sub Topic** | **Reading Reference** | **Pedagogy** | **Session Learning Outcomes** | **CLO** |
| **Module I:** **Descriptive Statistics** |
|  | * Introduction
* Presenting the Data
* Exploratory Data Analysis
 | Text, Chpt: 2Page: 14-40 | Discussion & Caselets | To make students learn the importance of using data in business decision making and how to compile and present the data | CLO1 |
|  | * Measures of Central Tendency (Mean, Weighted Mean, Median & Quantiles)
 | Text, Chpt: 3Page: 74-104 | Case – Nirmal: Discussion & Solving by MS Excel, Problem Solving | To make students learn how, when and why we use different measures of central tendency | CLO1 |
|  | * Coefficient of Dispersion
* Coefficient of Variation
 | Text, Chpt: 3Page: 111-135 | Case – Nirmal: Discussion & Solving by MS Excel, Problem Solving | To make students learn how, when and why we use different measures of dispersion and relative measures | CLO1 |
|  | * Measures of Shapes: Skewness & Kurtosis
* Box-Plot and Stem & Leaf
* Five-Point Summary
 | Instructor Handouts | Case – Nirmal: Discussion & Solving by MS Excel, Problem Solving | To make students understand relative measures and how distributions are different based on their shapes | CLO1 |
| **Module II: Probability & Probability Distributions** |
|  | * Introduction and applications of probability
* Different approaches towards probability
* Probabilities under the conditions of independence
* Law of Addition
 | Text, Chpt: 4Page: 154-171 | Caselets, Problem Solving | To recognize and quantify the uncertainty involved in real world business problems | CLO2 |
|  | * Probabilities under the conditions of dependence
* Conditional, Joint and Total probability
 | Text, Chpt: 4Page: 172-188 | Case: Academic performance, Problem Solving | To understand the independent and dependent events and estimate probabilities  | CLO2 |
|  | * Insights from Additional information
* Priori & Posteriori Probabilities
* Bayes Theorem
 | Text, Chpt: 4Page: 188-196 | Caselets, Problem Solving | To learn that estimates of probability can be revised in managerial situations if additional information is available | CLO2 |
|  | * Random Variables
* Expected Value
* Application of Expected Value in decision making
 | Text, Chpt: 5Page: 210-224 | Caselets, Problem Solving | To use expected value to make decisions when there is uncertainty | CLO2 |
|  | * Binomial & Poisson Distribution
* Normal Distribution
* Standard Normal Distribution
 | Text, Chpt: 5Page: 225-246 | Problem SolvingSolving Excel  | To apply normal distribution in different functional areas | CLO2 |
| **Module III: Inferential statistics** |
|  | * Sampling: Concept
* Sampling Techniques: Random Sampling
 | Text, Chpt: 6Page: 278-288 | Guest Session | To make students understand the role of sampling in decision making | CLO3 |
|  | * Sampling distribution
* Use of standard error
 | Text, Chpt: 6Page: 296-304 | DiscussionCaselets | To make students understand the role of sampling in decision making | CLO2, CLO3 |
|  | * Concept of Estimation
* Point and interval estimation
* Estimation-How to estimate mean of a population from the sample
 | Text, Chpt: 7Page: 328-348 | Caselets Solving by MS Excel | To make students learn how to estimate certain characteristics of a population from the sample | CLO2, CLO3 |
|  | Sample size Estimation | Text, Chpt: 7Page: 364-369 | Problem Solving | To make students understand the importance of appropriate sample size and how to estimate | CLO3 |
|  | * Significance Testing-Introduction
* Setting up the hypothesis.
* Types of errors
 | Text, Chpt: 8Page: 379-384 | Caselets | To make students learn how to set up hypothesis for business situations | CLO2, CLO3 |
|  | * Conceptual basis to significance testing.
* Five-steps testing procedure
* Parametric & Non-Parametric Testing
* One Sample Test: Testing of mean for population
 | Text, Chpt: 8Page: 385-410 | Caselets Problem Solving | To enable students to use sample-information to decide whether a population possesses a particular characteristic | CLO2, CLO3 |
|  | * One Sample Test: Testing of mean for population (t-test)
* One Sample Test: Testing of proportion for population
 | Text, Chpt: 8Page: 411-417 | Caselets Problem Solving | To enable students to use sample-information to decide whether a population possesses a particular characteristic | CLO2, CLO3 |
|  | * Two Samples Test: Testing differences between two population-means (Large samples)
 | Text, Chpt: 9Page: 425-433 | Caselets Problem Solving | To use samples from two populations to decide about how the populations means are compared | CLO2, CLO3 |
|  | * Two Samples Test: Testing differences between two population-means (Small samples)
* Concept of p-value
 | Text, Chpt: 9Page: 434-444 | Case – Nirmal: Discussion & Solving by MS Excel | To use samples from two populations to decide about how the populations means are compared | CLO2, CLO3 |
|  | * Two Samples Test: Paired t test
* Testing Difference of Proportions
 | Text, Chpt: 9Page: 445-467 | Case – Nirmal: Discussion & Solving by MS Excel | To enable the students to decide how the populations can be compared for related samples  | CLO2, CLO3 |
|  | * ANOVA
 | Text, Chpt: 11Page: 555-581 | Case – Nirmal: Discussion & Solving by MS Excel | To enable the students to use samples from more than two populations to decide about how the populations means are compared | CLO2, CLO3 |
| **Module IV: Linear Regression and Correlation**  |
|  | * Regression model-to analyze relationship between variables
 | Text, Chpt: 12Page: 610-640 | Guest Session | To enable students to visualize the relationship between variables |  CLO4 |
|  | * Bi-variate Regression model
* To estimate the relationship between two variables
 | Text, Chpt: 12Page: 641-663 | Case –Omni : Discussion & Solving by MS Excel | To enable the students to estimate the relationship between two variable and take decision based on them | CLO2, CLO3, CLO4 |
|  | * Estimating Multiple regression models
* Concept of R-square/Adjusted R-square
* Examining significance of predictors
 | Text, Chpt: 13Page: 678-699 | Case – Pampers : Discussion & Solving by MS Excel | To examine decision making situation where there are more than one independent variable and to estimate the strength of relationship | CLO2, CLO3, CLO4 |
|  | * Review and assimilation of the entire course
* Summing up the learning and briefing them about the future analytical courses
 | -- | Discussion & Review | Review & Assimilation |  |

**7. Assessment Tasks**

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| **Assessment Item**  | **Description** | **Weightage**  | **CLO**  |
| Quiz | There will be 3 quizzes as per schedule. Quizzes will be conducted on Moodle. The duration of each quiz will be 10 minutes with 10 questions. Each quiz will be of 10 marks. Marks obtained in best 2 quizzes will be added and weighted for 20 % in total marks. | 30 | CLO1, CLO2, CLO3 |
| Group Project | Project will involve application of course content to the primary/secondary data. They will collect the data (Primary/secondary), analyse it and prepare the report for the same. There will be stage wise submission for the project.The Project-Report will consist of following heads:•Table of Content•Executive Summary •Introduction•Objective of the Study/Problem: Topic.•Methodology: Data Collection•Concept/Formula used•Calculation/Excel Output (Excel output table included)•Analysis & Interpretation.•Conclusion.•Limitations of the Study•Data Sheet (In Annexure)The Project will be evaluated (on the max. score=20) on the following basis:•Project Report•Group-Viva•Participation. •Peer Feedback (of other members of the Group on the Feedback Form) | 30 | CLO3, CLO4 |
| **No Mid-Term Examination** |
| End-Term Examination | It will be based on the entire course. This will consist of application-based questions, situations and /or on case study | 40 | CLO1, CLO2, CLO3, CLO4 |

**Rubrics for Assessment Tasks**

***RUBRICS FOR CLOs***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CRITERIA | LEVEL 1 BEGINING  | LEVEL 2 AVERAGE  | LEVEL 3 ACCOMPLISHED | LEVEL 4 EXCELLENT |
| **CLO1:** Explain and perform Exploratory Data Analysis (EDA) | Know the name of the Measures of EDA | Understand and explain the measures of EDA  | Apply the measures of EDA  | Apply the measures of EDA and use for decision making for real business scenario |
| **CLO2:** Calculate probability-estimates to represent uncertainty | Know the probability as a mathematical ratio | Understand that probability is a measure of uncertainty | Able to estimate probability measures for business scenario  | Able to visualize the uncertainty in business situations and to apply the measures for future decision making |
| **CLO3:** Apply sample(s) data to infer about the population | Know the name of sampling schemes, terms and measures of estimation & significance testing broadly | Understand the sampling schemes, terms and measures of estimation & significance testing | Apply the sampling schemes, terms and measures of estimation & significance testing | Apply the sampling schemes, terms and measures of estimation & significance testing to business problems and able to take decisions |
| **CLO4:** Estimate relationship between two or more variables | Know the terms | Understand and estimate the regression models and relevant terms | Estimate and apply the regression models and relevant terms for business decision making | Solve the different business problems by applying relevant regression model and able to predict the future scenario and have understanding that regression does not indicate cause & effect |

***RUBRICS for Quiz***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criteria** | **Poor****up to 30%** | **Fair****30-60%** | **Good****60-80%** | **Excellent****80% or More** |
| UNSATISFACTORY  | MINIMAL  | PROFICIENT | EXEMPLARY |
| Clarity of Concepts and ability to apply them | Only up to 30% answers are correct. Most of the concepts are not clear and student is unable to understand the same. | Between 30 – 60% answers are correct. Many of the concepts are clear and understood by student. | Between 60 – 80% answers are correct. Majority of concepts are clear and understood by student. | 80% or more answers are correct. Most of concepts are clear and understood by the student. |

***RUBRICS for Mid Term and End Term***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Criteria** | **Poor****up to 30%** | **Fair****30-60%** | **Good****60-80%** | **Excellent****80% or More** |
| UNSATISFACTORY  | MINIMAL  | PROFICIENT | EXEMPLARY |
| Clarity of Concepts and ability to apply them | Only up to 30% answers are correct. Most of the concepts are not clear and student is unable to understand the same. | Between 30 – 60% answers are correct. Many of the concepts are clear and understood by student and able to solve the problems given | Between 60 – 80% answers are correct. Majority of concepts are clear and understood by student and also provide the answers in business language. | 80% or more answers are correct. Most of concepts are clear and understood by the student, provide answers in business language and may also be able to indicate the additional information required for better decision making |

***RUBRICS for Group Project***

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| --- | --- | --- | --- | --- |
| CRITERIA | DEVELOPING | APPROACHING PROFICIENCY | PROFICIENT | ADVANCED |
| Identify the relevant objectives and the information  | Objectives inadequately definedIncomplete information identified | Objectives defined but some finer points missingInformation identified upto average extent | Objectives well definedRelevant appropriate information identified | Objectives well definedAppropriate information collection from different sourcesAdditional information identified |
| Collect the appropriate information/data | Inadequate information collection | Average information collection | Adequate information collection | All (directly and indirectly related) information collected |
| Analyse the data as per the identified objectives | No analysis only presenting the data | Basic analysis performed | Basic & advanced data analysis | Complete and appropriate Data Analysis Able to use Interpretation for decision making  |
| Project Report | Language is poorDefined format is missingReference is inadequateTable of index is absentFormatting is poorResults & Interpretations not there | Language is occasionally poorFormat is followedReferences is somewhat adequateOccasionally format is not goodResults is there but not interpretation | Is adequately ImpressiveFormat is followedProper referencingResults & Interpretations is there  | Is impressiveImpressive FormatProper referencingResults, interpretation, conclusion, limitations, suggestions for future research are there  |