

**JAIPURIA INSTITUTE OF MANAGEMENT**

**PGDM-SM ; 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 Pre-requisite(s) | Data Interpretation & Excel |
| Course Requirement(s) | Working knowledge of Excel |
| Course Schedule (day and time of class) |  |
| Classroom # (Location) |  |
| Course Instructor |  |
| Course Instructor Email |  |
| Course Instructor Phone (Office) |  |
| Student Consultation Hours |  |
| Office location |  |

**1. 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.

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

**Graduate Attributes (GAs)**

GA 1: Self-initiative

GA 2: Deep Discipline knowledge

GA 3: Critical Thinking and Problem Solving

GA 4: Humanity, Team-Building and Leadership Skills

GA 5: Open and Clear Communication

GA 6: Global Outlook

GA 7: Ethical Competency and Sustainable Mindset

GA 8: Entrepreneurial and Innovative

**Key Differentiators**

KD 1: Entrepreneurial Mindset

KD 2: Critical Thinking

KD 3: Sustainable Mindset

KD 4: Team-Player

**Programme Learning Outcomes (PLOs)**

The graduates of PGDM at the end of the programme will be able to:

PO 1. Communicate effectively and display inter-personal skills

PO2. Demonstrate leadership and teamwork towards achievement of organizational goals

PO 3. Apply relevant concepts for decision-making in service businesses.

PO 4. Develop innovative thinking for effective management of services.

PO 5. Demonstrate domain competency in a chosen sector of services industry.

PO 6. Appreciate sustainable and ethical business practices.

PO 7. Leverage technology for services management.

PO 8. Demonstrate capability as an independent learner.

**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)**

**3. Mappings**

**Mapping of CLOs with GAs**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **GA 1** | **GA 2** | **GA 3** | **GA 4** | **GA 5** | **GA 6** | **GA 7** | **GA 8** |
| **CLO 1** |  |  |  |  |  |  |  |  |
| **CLO 2** |  |  |  |  |  |  |  |  |
| **CLO 3** |  |  | **X** |  |  |  |  |  |
| **CLO 4** |  |  | **X** |  |  |  |  |  |
| **Total** |  |  | **2** |  |  |  |  |  |

**Mapping of CLOs with KDs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **KD 1 (Entrepreneurial Mindset)** | **KD 2 (Critical Thinking)** | **KD 3 (Sustainability)** | **KD 4 (Team Player)** |
| **CLO 1** |  |  |  |  |
| **CLO 2** |  |  |  |  |
| **CLO 3** |  | **X** |  |  |
| **CLO 4** |  | **X** |  |  |
| **Total** |  | **2** |  |  |

**Mapping of CLOs with POs**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CLO's | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
| CLO 1 |  |  |  |  |  |  |  |  |
| CLO 2 |  |  | R\* |  |  |  |  |  |
| CLO 3\* |  |  |  |  |  |  |  | M\* |

**\*For course attainment**

**4. Prescribed VED framework**

|  |  |  |  |
| --- | --- | --- | --- |
| **Module** | **Vital**  **(prerequisite or basic knowledge or skills)** | **Essential**  **(Non-imperative yet significant)** | **Desirable**  **(adds substance, breadth, or interest to a subject or skill)** |
| **Descriptive Statistics** | * Exploratory Data Analysis * Measures of Central Tendency * Coefficient of Dispersion | * Presenting the Data * Coefficient of Variation * Skewness * Five-Point Summary | * Kurtosis * Box-Plot and Stem & Leaf |
| **Probability & Probability Distributions** | * Introduction and applications of probability * Normal Distribution * Standard Normal Distribution | * Probabilities under the conditions of independence * Law of Addition * Probabilities under the conditions of dependence * Conditional, Joint and Total probability * Expected Value & Applications | * Different approaches towards probability * Bayes Theorem * Random Variables * Binomial & Poisson Distribution |
| **Inferential statistics** | * Sampling: Concept * Concept of Estimation * Point and interval estimation * Significance Testing-Introduction * Setting up the hypothesis. * p-value | * Sampling Techniques: Random Sampling * Estimation-How to estimate mean of a population from the sample * Sample size Estimation * Five-steps testing procedure * One Sample Test: Testing of mean for population * t-test * Two Samples Test: Testing differences between two population-means (Large & small samples) * Paired t test * ANOVA | * Sampling distribution * Use of standard error * Types of errors * Conceptual basis to significance testing * Parametric & Non-Parametric Testing * One Sample Test: Testing of proportion for population * Testing Difference of Proportions |
| **Linear Regression and Correlation** | * Identify the independent & dependent variables * Regression model-to analyze relationship between variables | * Estimating Multiple regression models * Concept of R-square/Adjusted R-square * Examining significance of predictors | * Bi-variate Regression model * To estimate the relationship between two variables * Regression Analysis vs Cause & Effect relationship |

|  |  |
| --- | --- |
|  | Pre-class |
|  | In-class |
|  | Beyond class |

**5. 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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**Internet Resources**

ebscohost-ebooks: Statistics: A Very Short Introduction, Hand, D. J. In: Very Short Introductions. Oxford: Oxford University Press-eBook.

ebscohost-ebooks: Starting Statistics: A Short Clear Guide, Burdess, Neil. Los Angeles: SAGE Publications Ltd-eBook.

ebscohost-ebooks: Using Statistics: A Gentle Introduction, Rugg, Gordon. In: Open up Study Skills. Maidenhead, England: McGraw-Hill Education-eBook

http://www.indiandata.com:It provides a comprehensive coverage on Indian economics scenario with relevant trade statistics and a directory of Indian Businesses

www.indiastat.com: The web portal provides well compiled socio-economic statistical information pulled out from various authentic secondary sources.

http://as.wiley.com/WileyCDA/Section/id-350081.html: It provides journal, books and articles on business statistics.

http://learnerstv.com

https://www.khanacademy.org/

http://stattrek.com/

http://home.ubalt.edu/ntsbarsh/business-stat/opre504.htm

**6. 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: 2  Page: 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: 3  Page: 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: 3  Page: 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: 4  Page: 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: 4  Page: 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: 4  Page: 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: 5  Page: 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: 5  Page: 225-246 | Problem Solving  Solving Excel | To apply normal distribution in different functional areas | CLO2 |
| **Module III: Inferential statistics** | | | | | |
|  | * Sampling: Concept * Sampling Techniques: Random Sampling | Text, Chpt: 6  Page: 278-288 | Guest Session | To make students understand the role of sampling in decision making | CLO3 |
|  | * Sampling distribution * Use of standard error | Text, Chpt: 6  Page: 296-304 | Discussion  Caselets | 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: 7  Page: 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: 7  Page: 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: 8  Page: 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: 8  Page: 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: 8  Page: 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: 9  Page: 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: 9  Page: 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: 9  Page: 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: 11  Page: 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: 12  Page: 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: 12  Page: 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: 13  Page: 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**

|  |  |  |  |
| --- | --- | --- | --- |
| **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. | 20 | 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) | 20 | CLO3, CLO4 |
| Mid-Term Examination | It will be based on the first half of the course. This will consist of application-based questions, situations and /or on case study | 20 | CLO1, CLO2, CLO3 |
| 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 | CLO2, CLO3, CLO4 |

**8. 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***

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| CRITERIA | DEVELOPING | APPROACHING PROFICIENCY | PROFICIENT | ADVANCED |
| Identify the relevant objectives and the information | Objectives inadequately defined  Incomplete information identified | Objectives defined but some finer points missing  Information identified upto average extent | Objectives well defined  Relevant appropriate information identified | Objectives well defined  Appropriate information collection from different sources  Additional 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 poor  Defined format is missing  Reference is inadequate  Table of index is absent  Formatting is poor  Results & Interpretations not there | Language is occasionally poor  Format is followed  References is somewhat adequate  Occasionally format is not good  Results is there but not interpretation | Is adequately Impressive  Format is followed  Proper referencing  Results & Interpretations is there | Is impressive  Impressive Format  Proper referencing  Results, interpretation, conclusion, limitations, suggestions for future research are there |

**9.Time Budgeting in Course Planning:**

Please note that while assigning activities and planning teaching schedules following table may be of help. The weightage of items in the table is prescriptive and may vary according to course requirement. Yet it is indicative of how student time per course can be budgeted:

|  |  |  |
| --- | --- | --- |
| Activity | Description | Time Budgeted |
| Classes | 2-3 hours per week for 12 weeks | 30 hours |
| Reading | Prescribed readings and making notes | 15 hours |
| Preparation of set questions, exercises and problems | Including shared and group exercises | 30 hours |
| Preparation of assignment | Reading and writing | 10 hours |
| Study and revision for test and centralized examination | Self-preparations | 20 hours |
| **TOTAL** |  | 105 hours |

**Instructions:**

Students will be expected to maintain a daily log of their learning and make an action plan. The continuous evaluation tools would be implemented as per schedule and collected for evaluation.

Students are encouraged to visit videos available on Impartus, you tube on TED talks, and readings available at websites like course era, etc.

**10. Academic Conduct**

**Institute’s Policy Statements**

It is the responsibility of every student to be aware of the requirements for this course, and understand the specific details included in this document. It is emphasized that this course requires a significant commitment outside of formal class contact.  The learning tasks in this course may include classes (lectures or seminars), required reading, the preparation of answers to set questions, exercises and problems, and self-study. In addition, students may be required to complete an assignment, test or examination.

**LMS-Moodle/Impartus:**

LMS-Moodle/Impartus is used to host course resources for all courses. Students can download lecture, additional reading materials, and tutorial notes to support class participation.

**Late Submission**

Assessment tasks submitted after the due date, without prior approval/arrangement, will be not be accepted. Requests for extension of time must be made with the faculty member concerned and based on Special Consideration guidelines.

**Plagiarism**:

Plagiarism is looked at as the presentation of the expressed thought or work of another person as though it is one's own without properly acknowledging that person.

Cases of plagiarism will be dealt with according to Plagiarism Policy of the institute. It is advisable that students should read the Student Handbook for detailed guidelines. It is also advisable that students must not allow other students to copy their work and must take care to safeguard against this happening. In cases of copying, normally all students involved will be penalized equally; an exception will be if the student can demonstrate the work is their own and they took reasonable care to safeguard against copying.