

**INTERNATIONAL MANAGEMENT INSTITUTE, BHUBANESWAR**  
**PROGRAMME NAME: POST GRADUATE DIPLOMA IN MANAGEMENT (PGDM)**  
**BUSINESS STATISTICS (QM502)**  
**CREDIT: FULL (2 CREDITS)**  
**SESSION DURATION: 60 MINUTES**

**TERM: II**  
**YEAR: 2018-2019**  
**BATCH: I**

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**Office hours:** 9.30 AM – 5.30 PM

**Course Introduction:** The illustrious writer H.G. Wells stated that “*Statistical thinking will one day be as necessary for efficient citizenship as the ability to read and write.*” That time is upon us now and the statement is even truer for managerial competence. Statistics is a tool required by managers to analyze, interpret and solve business problems. It gives them an objective perspective on problem at hand. This course addresses the need to get acquainted with the basic concepts and areas of managerial applications of statistics. When at a crossroad, it will enable students to draw from a range of techniques the appropriate scientific method to evaluate the outcomes of different courses of action. Successful completion would help the students to use analytical reasoning in business decision making.

**Learning Outcomes:**

1. To enable the student to gain a quantitative orientation.
2. To introduce concepts of statistics
3. To facilitate hands-on practice of statistical analysis.
4. To understand statistics from a business application perspective through case discussion.

**Course Pedagogy:** The sessions will be a blend of interactive lectures and discussions and will be supplemented by cases and exercises. **Students are expected to come prepared and participate in the discussions.**

**Course Readings:**

1. Levin, R.I., Rubin, D.S., Siddiqui, M.H., and Rastogi, S. (2012). *Statistics for Management*, 8<sup>th</sup> Edition. Pearson Education, New Delhi.
2. Huff, D. (1993) *How to Lie with Statistics*. W.W. Norton & Company.

**Course Evaluation criteria:**

Class participation (Including Case preparation, discussion & presentation)	20%
Quiz (2)	20%
Mid-term	30%
End-term	30%
<b>Total</b>	<b>100%</b>

Quiz 1 and 2 will be held after 9 and 18 sessions, respectively.

**Session Plan\*:**

Session	Topic	Learning Outcomes	Readings
1-2.	<b>Introduction to course</b> <b>Frequency Distribution</b> <b>Probability Distribution</b> ❖ Discrete & continuous random variable	LO – 1 LO – 2	<b>Text book:</b> Ch. 3 (Pages 74-134) Ch. 5 (Pages 210-217) Ch. 5 (Pages 225-244) <b>Attempt:</b> Review & application exercises: 3-92 (p. 146), 3-99 (p. 147) Applications: 5-22, 5-26 (p. 236-237)
	<b>Continuous Probability distribution – Normal distribution</b> ❖ Characteristics of Normal distribution ❖ Uses of Normal distribution ❖ Standard normal probability distribution	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> Ch. 5 (Pages 246-263) <b>Attempt:</b> Applications: 5-41, 5-42, 5-46, 5-49 <b>Case:</b> <i>Specialty toys</i>
3-4.	<b>Sampling and sampling distribution</b> ❖ Sampling error ❖ Non-sampling error ❖ Sampling distribution of mean ❖ Standard error ❖ Central Limit Theorem ❖ Relationship between sample size and standard error	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> Ch. 6 (Pages 278-290; 296-316) <b>Attempt:</b> Applications: 6-32, 6-38 (p. 311-312) <b>Case:</b> <i>Acceptable pins</i> <b>Read:</b> Random sampling with Excel
5-6.	<b>Estimation</b> ❖ Point estimation ❖ Interval estimation ❖ Confidence interval and confidence level ❖ Confidence interval for mean using z-distribution <b>Testing hypotheses (One sample – large sample)</b> ❖ Level of significance ❖ Type I and type II errors ❖ 2-tailed and 1-tailed tests of hypothesis	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> Ch. 7 (Pages 316-334) Ch. 8 (Pages 366-385) <b>Attempt:</b> Applications: 7-15 (p. 328), 7-27 (p. 335) Applications: 8-27, 8-30, 8-31 (p. 386-387)  Applications: 8-27, 8-31 (p. 400-401) <b>Case:</b> <i>Quality associates, Inc.</i>
7-8.	<b>Testing hypotheses (One sample - small sample)</b>	LO – 1 LO – 2	<b>Text book:</b> Ch. 7 (Pages 341-346) Ch. 8 (Pages 397-400)

	<ul style="list-style-type: none"> <li>❖ Confidence interval for mean using t-distribution</li> <li>❖ Degrees of freedom</li> <li>❖ 2-tailed and 1-tailed tests of hypothesis</li> </ul>	LO – 3 LO – 4	<b>Attempt:</b> 7-41, 7-43 (p. 350), 8-45, 8-47, 8-48, 8-50 (p. 402-403) <b>Case:</b> <i>Cutcraft Cutlery Corporation</i>
9-10	<b>Testing hypotheses: Two sample test (Differences of population means)</b> <ul style="list-style-type: none"> <li>❖ Large sample test</li> <li>❖ Small sample test</li> <li>❖ Dependent samples</li> </ul>	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> Ch. 9 (Pages 412-435) <b>Attempt:</b> Applications: 9-2, 9-3 (p. 418); 9-7, 9-8 (p. 429); SC 9-6, 9-17 (p. 438-439)
11.	<b>Sample size and other concepts</b> <ul style="list-style-type: none"> <li>❖ Sampling procedures</li> <li>❖ Relationship between sample size and standard error</li> <li>❖ Determining the sample size in estimation</li> <li>❖ Concept of p-value</li> <li>❖ Measuring the power of a hypothesis test</li> </ul>	LO – 1 LO – 2 LO – 3 LO – 4	Ch. 6 (Pages 268-280); Ch. 7 (Pages 351-353) Ch. 9 (Pages 450-454); Ch. 8 (Pages 388-390) <b>Attempt:</b> Applications: SC 8-12 (p. 402), 8-51 (p. 403), 8-53, 8-55 (p. 405-406)
12-13.	<b>Testing hypotheses: One-sample and Two-sample test (Proportion and difference between proportions)</b> <ul style="list-style-type: none"> <li>❖ Hypothesis testing of proportions: Large samples</li> <li>❖ Tests for difference between proportions: Large samples</li> </ul>	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> Ch. 5 (Pages 225-235); Ch. 7 (Pages 349-351) Ch. 8 (Pages 405-409); Ch. 9 (Pages 455-462) <b>Attempt</b> Ex. 8.6: SC 8-10 (p. 410) Applications: 8-39, 8-43 (p. 410-411) Ex. 9.5: 9-23, 9-25 (p. 463)
14-15.	<b>Chi-square test</b> <ul style="list-style-type: none"> <li>❖ Test of independence</li> <li>❖ Comparing proportions</li> </ul>	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> Ch. 11 (Pages 518-531) <b>Attempt:</b> Applications: 11-7, 11-11, 11-13 (p. 532-533) <b>Case:</b>
16-17.	<b>Analysis of variance (ANOVA): One-way</b> <ul style="list-style-type: none"> <li>❖ Between treatments estimate of population variance</li> <li>❖ Within treatments estimate of population variance</li> </ul>	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> Ch. 11 (Pages 542-553) <b>Attempt:</b> Applications: 11-27 (p. 564), 11-32, 11-35 (p. 565-566) Applications: 11-60, 11-61 (p. 588)

	❖ F-test		<b>Case:</b>
18-20.	<b>Correlation and Simple Regression Analysis</b> ❖ Estimation using the regression line ❖ Correlation analysis ❖ Making inferences about population parameters	LO – 1 LO – 2 LO – 3 LO – 4	<b>Text book:</b> Ch. 12 (Pages 596-614, 629-638) <b>Attempt:</b> Applications: 12-10 (p. 601-602), 12-16 (p. 624-625), 12-21 (p. 626), 12-24 (p. 627), 12-31 (p. 642) & 12-37 (p. 648) <b>Case:</b>

\* Sessions 1 – 10: Dr. Manit Mishra  
Sessions 11-20: Dr. Rajesh Katiyar

### Academic integrity

**a) Plagiarism** is the use of or presentation of ideas, works that are not one's own and which are not common knowledge, without granting credit to the originator. Plagiarism is unacceptable in IMI and will invite penalty. Type and extent of penalty will be at the discretion of the concerned faculty.

**b) Cheating** means using written, verbal or electronic sources of aid during an examination/ quiz/ assignment or providing such assistance to other students (except in cases where it is expressly permitted by the faculty). It also includes providing false data or references/list of sources which either do not exist or have not been used, having another individual write your paper or assignment or purchasing a paper for one's own submission. Cheating is strictly prohibited at IMI and will invite penalty as per policies of the Institute.