

**Name of Institute: Indus Institute of Management Studies (IIMS)**

**Name of Faculty: Dr Neerav Verma**

**Course Code: BB0603**

**Course Name: Operations Research**

Pre-requisites: H.S.C

Credit Points: 3 Credits

Offered Semester: II

### **Course Lecturer (Weeks 01 – 15)**

Full name: Dr Neerav Verma

Department with Siting location: Management

Telephone: 9818351870

Email: neeravbhu@gmail.com

Consultation times: 4:00 PM to 5:00 PM

Students will be contacted throughout the Session via Mail with important information relating to this Course.

### **Course Objectives**

To familiarize students with the types of business problems often faced by corporate entities. To help students develop skills in structuring various operations research problems using mathematical tools.

### **Course Outcomes (CO)**

On successful completion of this course students will be able to:

**CO1:** To apply research techniques in quantitative and qualitative aspects.

**CO2:** To schedule the projects and find the early ways of finishing it.

**CO3:** To develop simulation models.

**CO4:** To minimize the resource allocation for project.

**CO5:** To maximize the productivity with help of least cost techniques

**CO6:** To take decisions under uncertainty & risk business environment

## Course Outline

### Unit-I

#### Introduction of Operations Research

Nature, definition, characteristics and methodology of operations research, role of operations research in managerial decision making. Introduction to various tools of operations research

### Unit-II

#### Linear Programming Problem (LPP)

Introduction, advantages and applications of LPP, Mathematical formulation, Graphical & Simplex Methods for solving two variable LPP.

### Unit-III

#### Transportation Model

Introduction, advantages and applications of Transportation Model, North West Corner Rule, Matrix Minima & VAM Methods of finding basic feasible solution. Degeneracy and its removal, Modified Distribution Method.

#### Assignment Model

Introduction, advantages and applications of Solving assignment problems by Hungarian method.

### Unit-IV

#### Decision making under Uncertainty & Risk

Criteria of Maximax, Maximum, Maximax Regret, Laplace & Hurwicz methods. Decision making under Risk-Criteria of EMV & EOL.

## Method of delivery

Lectures, PPT, Quantitative Case Studies/ Numerical, Experiential Exercises, Active Learning Techniques.

## Study time

Three hours per week

## CO-PO Mapping

### Programme Outcomes (POs)

PO1: Enhance Conceptual clarity & domain knowledge

PO2: Develop Awareness of Business Environment

PO3: Build Effective oral & written communication skills

PO4: Prepare Original thinkers and creative problem solvers

PO5: Comprehend Ethical and Social Responsibility

PO6: Develop Ability for team building & effective human development

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	PO1	PO2	PO3	PO4	PO5	PO6
<b>CO 1</b>	<b>3</b>		<b>1</b>	<b>3</b>		
<b>CO 2</b>	<b>3</b>			<b>3</b>		
<b>CO 3</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>		
<b>CO 4</b>	<b>3</b>		<b>2</b>	<b>3</b>		
<b>CO 5</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>		
<b>CO 6</b>	<b>3</b>			<b>3</b>		

### Blooms Taxonomy and Knowledge Retention (For reference)

(Blooms taxonomy has been given for reference)

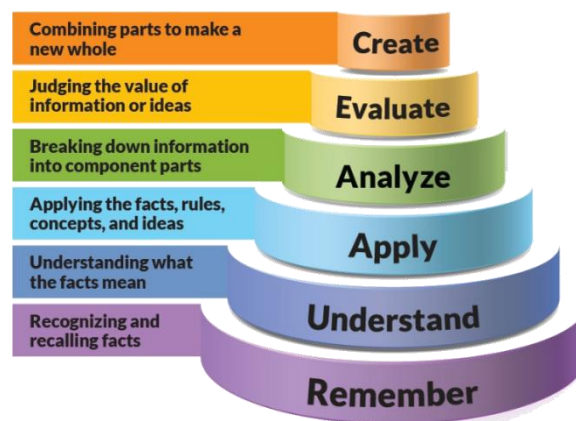


Figure 1: Blooms Taxonomy

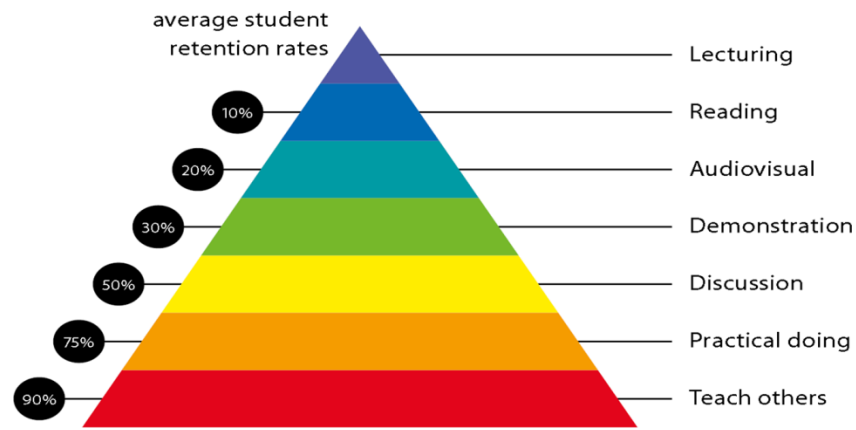


Figure 2: Knowledge retention

## Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department of _____ Graduate Capabilities
<p><b>Informed</b></p> <p>Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.</p>	<p><b>1 Professional knowledge, grounding &amp; awareness</b></p>
<p><b>Independent learners</b></p> <p>Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.</p>	<p><b>2 Information literacy, gathering &amp; processing</b></p>
<p><b>Problem solvers</b></p> <p>Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible,</p>	<p><b>3 Problem solving skills</b></p>

thorough, innovative and aim for high standards.	
<b>Effective communicators</b> Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	<b>4 Written communications</b>
	<b>5 Oral communication</b>
	<b>6 Teamwork</b>
<b>Responsible</b> Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	<b>7 Sustainability, societal &amp; environmental impact</b>

### Practical work:

1. ASSIGNMENT -1: Unit 1 & 2
2. ASSIGNMENT -2: Unit 3 & 4

### Lecture/ Tutorial Times:

1hr / lecture or tutorial

### Attendance Requirements:

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

### Details of referencing system to be used in written work

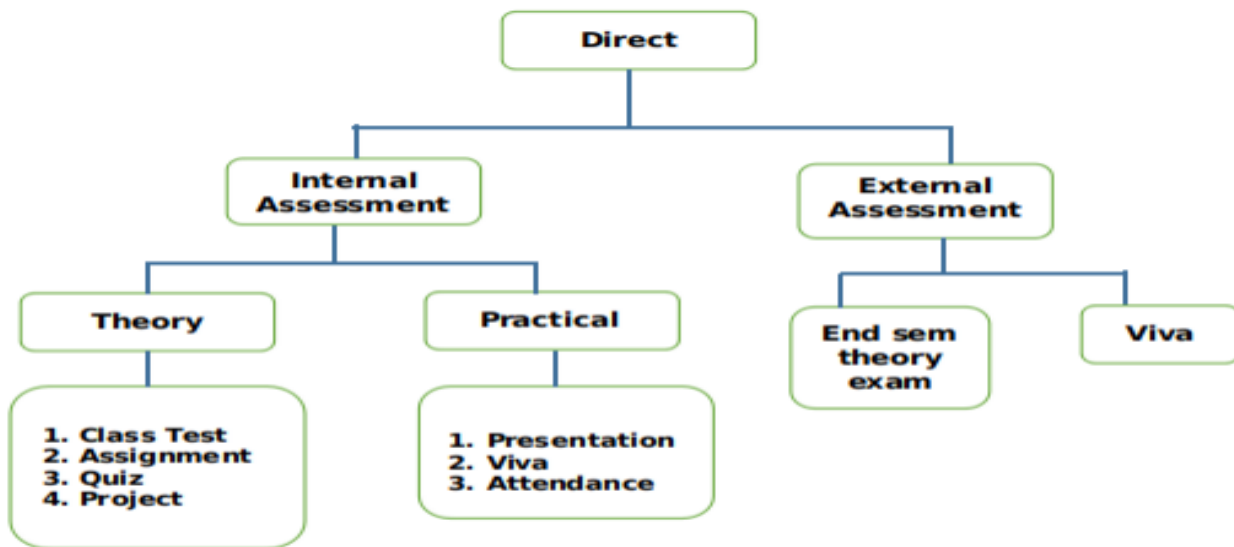
#### Text Books:

1. Paneerselvam, Operations Research, PHI, N. Delhi.
2. Taha, Operations Research: An Introduction, Pearson Education.
3. Vohra, N.D.; Quantitative Techniques in Management; Tata McGraw Hill Publishing Company Ltd., New Delhi.

### Reference Books:

1. Kapoor, V.K., Operations Research; Sultan Chand and Sons, New Delhi.
2. Sharma, J.K., Operations Research: Theory and Applications, Macmillan India Ltd, New Delhi.
3. Kalavathy, Operations Research, Vikas Publishing House, New Delhi.
4. Natarajan, A.M, Operation Research, Pearson Education

### ASSESSMENT GUIDELINES



Final course mark will be calculated from the following:

<b>Assignment</b>	<b>5+5 Marks</b>
<b>Presentation</b>	<b>5 Marks</b>
<b>Attendance</b>	<b>5 Marks</b>
<b>Mid Semester Exam</b>	<b>40 Marks</b>
<b>Final Exam</b>	<b>40 Marks</b>

### SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e. mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

## Practical Work Report/Laboratory Report:

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### Late Work

Late assignments will not be accepted without specific reasons and supporting documents.

### Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. **Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.**

### Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

### University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

**Plagiarism** - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

***Do not copy the work of other students.***

***Do not share your work with other students (except where required for a group activity or assessment)***

**Course Schedule (subject to change)**

**(Mention quiz, assignment submission, breaks etc as well in the table under the Teaching Learning Activity Column)**

Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
Weeks 1	Nature, definition, characteristics and methodology of operations research,	CO1, CO2 & CO3	Lecture
Weeks 2	Role of operations research in managerial decision making. Introduction to various tools of operations research	CO1, CO2, CO3 & CO4	Lecture
Week 3	Introduction, advantages and applications of Linear Programming Problem (LPP)	CO1, CO2 & CO3, CO6	Lecture
Week 4	LPP: Mathematical formulation	CO2, CO5 & CO6	Lecture
Week 5	LPP: Graphical Method	CO1, CO3 & CO4	Lecture
Week 6	LPP: Simplex Methods for solving two variables	CO2, CO3 & CO4	Lecture
Week 7	Revision: Unit 1 & 2		Lecture
Week 8	Introduction, advantages and applications of Transportation Problem (TP) Mode and its' formulation	CO2, CO3 & CO6	Lecture
Week 9	TP: North West Corner Rule, Matrix Minima & VAM Methods of finding basic feasible solution	CO1, CO2 & CO4	Lecture
Week 10	TP: Degeneracy and its removal, Modified Distribution Method	CO2 & CO4	Lecture
Week 11	Introduction, advantages and applications of Solving assignment problems by Hungarian method	CO1, CO2 & CO4	Lecture
Week 12	Decision making under Uncertainty: Criteria of Maximax, Maximin, Maximax Regret	CO4 & CO5	Lecture
Week 13	Decision making under Uncertainty: Laplace & Hurwicz methods	CO2, CO3, CO5 & CO6	Lecture
Week 14	Decision making under Risk: Criteria of EMV & EOL	CO2, CO3, CO5 & CO6	Lecture
Week 15	Revision: Unit 3 & 4		Lecture