



**INTERNATIONAL MANAGEMENT INSTITUTE, BHUBANESWAR**  
**PROGRAMME NAME: Post Graduate Diploma in Management (PGDM 2017(PT))**  
**Application of Operation Research**  
**CREDIT: Full (2 credits)**  
**SESSION DURATION: 1.5 Hrs**

**TERM: IV**  
**YEAR: 2019-2020**  
**BATCH: 2018**

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**Course Introduction:**

The objective of operation research (OR) is to solve the decision-making problems that confront and confound managers in both the public and the private sector by developing mathematical models of those problems. These models have traditionally been solved with various mathematical techniques, all of which lend themselves to specific types of problems. Thus, OR as a field of study has always been inherently mathematical in nature, and as a result sometimes complex and rigorous. Even if these techniques are not used on the job, the logical approach to problem solving embodied in OR is valuable for all types of jobs in all types of organizations. OR consists of more than just a collection of mathematical modeling techniques; it embodies a philosophy of approaching a problem in a logical manner, as does any OR not only teaches specific techniques but also provides a very useful method for approaching problems. OR is **important** because it is a helpful tool used to solve complex problems under uncertainty. OR techniques fill this void with methods that quantify issues and give business managers a better basis for making decisions.

**Learning Outcome (LO):**

- LO-1: To develop competence and skill sets in using operation research in a variety of contexts.
- LO-2: To display familiarity with operation research and how operation research concepts can be used to improve the competitive position of the firm.
- LO-3: To use analytical software tools to solve operation research problems.

**Course Pedagogy:**

- Class will be a mix of interactive lectures, case discussions, games, simulations and projects.
- Each class will start with a presentation of relevant case by a group of students who will also cover the topic planned for that class.

**Course Readings:**

1. Sharma , J.K,( 2015), Operation Research, *Theory and Applications*, MacMillan Business Books.
2. Taylor, B. W. (2011), Introduction to Management Science, Pearson Education, Eleventh Edition
3. Albright & Winston (2015), Management Science Modeling, Cengage learning, Fourth Ed.
4. Albright, S.C. & Winston, W.L., (2011), Management Science Modelling with Spreadsheets, Cengage learning, First, Edition.
5. Stevenson,W.J. & Ozgur, C. (2011).Introduction to Management Science with Spreadsheets, Tata McGraw-Hill, Seventh Edition.

**Course Evaluation Criteria:**

Component	Mapped learning objective (LO)	Weightage
Class participation and assessment (Including Case preparation, discussion & presentation)	L01, L02, L03	20%
Quiz	L01	20%
Presentation	L02, L03	20 %
End-term	L01, L02, L03	40%
<b>Total</b>		<b>100%</b>

**Session Plan**

Session	Topic	Learning Outcome	Readings
1	<b>The Management Science Approach to Problem Solving</b> <ul style="list-style-type: none"> <li>• Management Science Application</li> <li>• Model Building</li> <li>• Linear Programing: Solution and Sensitivity Analysis</li> <li>• Computer Solution</li> </ul>	<b>L01</b>	Ch.1 and Ch. 2 from Course Reading 1 & Ch.1 and Ch. 2 from Course Reading 2

2	<b>Linear programming: Modelling Applications</b> <ul style="list-style-type: none"> <li>• <b>Management Science Application:</b> A Linear Programming Model for Optimal Portfolio Selection at GE Asset Management</li> </ul>	<b>L01, L03</b>	Ch.2 and Ch. 3 from Course Reading 1 &  Ch 3, Ch 4 from Reading 2
3	<b>Linear programming application (contd.)</b> <ul style="list-style-type: none"> <li>• Linear Programming Blending Applications in the Petroleum Industry</li> <li>• Employee Scheduling with Operation Research</li> </ul> <b>Data Envelopment Analysis</b>	<b>L02 &amp; L03</b>	Ch.2 and Ch. 3 from Course Reading 1 &  Ch. 4 of reading 2
4	Examples on Data Envelopment Analysis <b>Integer Programming Models</b> <ul style="list-style-type: none"> <li>• Integer Programming Solution</li> </ul>	<b>L01, L03</b>	Ch.7 from Course Reading 1 &  Ch. 4 &Ch. 5 of reading 2
5	<ul style="list-style-type: none"> <li>• Solution of Integer Programming Problems with Excel Solver</li> </ul>	<b>L01, L03</b>	Ch.7 from Course Reading 1 &  Ch4. & Ch.5 of reading 2
6	<b>The Transportation Model</b> <ul style="list-style-type: none"> <li>• Solution of Transportation Model with</li> <li>• Basic feasible solution and optimized solution</li> </ul>	<b>L01, L03</b>	Ch.9 from Course Reading 1 &  Ch. 6 of Reading 2
7.	<b>The Transshipment Model</b> <ul style="list-style-type: none"> <li>• Solution of Solution of Transshipment Model with Excel Solver.</li> <li>• <b>Introduction to assignment problem and application</b></li> </ul>	<b>L01, L02</b>	Ch.9 from Course Reading 1 &  Ch. 6 of Reading 2
8	<b>Queuing Analysis</b> <ul style="list-style-type: none"> <li>• Poisson distribution</li> <li>• Single server waiting line systems</li> <li>• Finite queue length and infinite length illustration</li> </ul>	<b>L01, L03</b>	Ch.16 from Course Reading 1 & Ch.13 of Reading 2
9	<ul style="list-style-type: none"> <li>• Multiple server problems and examples.</li> </ul>	<b>L01, L03</b>	Ch.16 from Course Reading 1 & Ch.13 of Reading 2

10	<b>Network Flow Models</b> <ul style="list-style-type: none"> <li>• Network Components</li> <li>• The Shortest Route Problem</li> </ul>	<b>L01, L03</b>	Ch. 7 of Reading 2
11	<b>Network flow model (continued)</b> <ul style="list-style-type: none"> <li>• The Minimal Spanning Tree Problem</li> <li>• Solution of Network Flow Problems with Excel Solver</li> </ul>	<b>L01, L02</b>	Ch.7 of Reading 2
11	<b>Multi-Criteria Decision-Making Problems</b> <ul style="list-style-type: none"> <li>• Goal Programming</li> <li>• Interpretation of Goal Programming</li> </ul>	<b>L01, L02</b>	Ch. 9 of Reading 2
12	<b>Non-Linear programming</b> <ul style="list-style-type: none"> <li>• Nonlinear Profit Analysis</li> <li>• Decision</li> <li>• Constrained optimization</li> <li>• Solution of Non-Linear Programming with Excel.</li> </ul> <b>Introduction to AHP</b>	<b>L02, L03</b>	Ch.9 of Reading 2
13-14	Presentations and conclusion		

### 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.

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