**Instruction Plan on Operations Research/Management Science**

**Instructors: Asst. Prof. Anita Prajapati, Ph.D.**

**Class lecture: 3 hrs**

**Tutorial: 1 hr**

**Practical: 1.5 hrs**

**Start Date: Jestha 2080**

**End Date: Bhadra 2080**

Operations Research/Management Science (OR/MS) is the use of mathematical models and quantitative approaches for decision-making. It was originated some 70 years ago in the military applications in the 2nd Great World War. Management Science is now being profusely used in managerial decision-making especially with the widespread application of personal computing in business, industrial and household sectors since 1990s.

This course is basically intended for introduction and application of OR/MS for managers with the help of spreadsheet software such as Microsoft EXCEL and its add-in software like SOLVER, CRYSTAL BALL etc. It is more application-oriented rather than teaching solving with mathematical models. This course is immensely popular in the North America for practicing managers.

**Objective of the course**

This course aims to provide introductory knowledge of principles of OR/MS to students’/practicing managers:

* To make capable of managing data, analyzing data such as sorting, pivoting tables, and applying statistical analysis in a spreadsheet environment
* To familiarize with forecasting methods such as time-series methods such as, models with trend components, seasonal components, regression models, and use of forecasting software CB PREDICTOR
* To familiarize with linear programming and multi-objective optimization models in production and manufacturing, transportation, and finance
* To help students to understand inventory models, and inventory models under risk
* To make familiar with simulation in decision-making under risk and uncertainty with the use of risk analysis software such as CRYSTAL BALL
* To familiarize with systems modeling and simulation such as queuing and inventory models
* To make capable in applying the knowledge gained during the course for solving real problems in decision-making

**Mark distribution**: **total marks =100**

**Internal Marks: =20**

1. Assignments =8
2. Assessment =8
3. Final course project and report = 4

**Final Examination =80**

## Prerequisite

**Students should be well familiar with Microsoft OFFICE software especially, WORD, EXCEL, and POWERPOINT.**

## Course proceedings

Course project on real and practical problems such as forecasting, inventory and optimization problems must be done. The report must be submitted on the acceptable format at the end of the course. Group presentation should be carried out at the end of the course period.

# **Textbook**

**Ragsdale, Cliff T., “Spreadsheet Modeling and Decision Analysis, A Practical Introduction to Management Science”, 5th edition, South Western, Cengage Learning, 2008. (E-book will be provided).**

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| **Serial No** | **week** | **Month** | **Topics** | **Remarks** |
| 1 | 2 | Jestha | Introduction to Modeling for Decisions; application and benefits of Operations Research; developing Models; analyzing and solving models; interpretation and Use of Model Results | Students have to do the assignments given |
| 2 | 3 | Jestha | Data analysis using regression analysis | Students have to do the assignments given |
| 3 | 4 | Jestha | Forecasting; models for Time-series with Trend Components; models for Time-series with Seasonal Components;  models for Time-series with Trend and Seasonal Components; using CB-Predictor of Crystal Ball software | Students have to do the assignments given |
| 4 | 1 | Ashad | Introduction to Optimization; linear and Multi-Objective Optimization Models;  modeling Optimization Problems in EXCEL | Students have to do the assignments given |
| 5 | 2 | Ashad | Building Linear Programming Models;  solving Linear Programming Models; network modeling | Students have to do the assignments given |
| 6 | 3 | Ashad | Goal programming & multi-objective programming | Students have to do the assignments given |
| 7 | 4 | Ashad | Decision Analysis | Students have to do the assignments given |
| 8 | 1 | Shrawan | Monte Carlo Simulation; applications of Monte Carlo Simulation; different Probability Distributions; building Simulation Models with CRYSTAL BALL; Decision and Risk Analysis; application of Decision and Risk Analysis. | Students have to do the assignments given |
| 9 | 2 | Shrawan | Monte Carlo Simulation continues | Students have to do the assignments given |
| 10 | 3 | Shrawan | Optimization and simulation: Optimization under uncertainty; Optimization and Monte carlo simulation | Students have to do the assignments given |
| 11 | 4 | Shrawan | Presentation on course project | Students have to do the assignments given |
| 12 | 1 | Bhadra | Assessment |  |