**Course Name:** Selected Topics in Operations Research and Decision Support
**Course Code:** DS495

## I. Basic Course Information

Major or minor element of program:[Major]
Department offering the course:[Operations Research and Decision SupportDepartment]

Academic level:[400 Level]
Semester in which course is offered:[First (fall) Semester]
Course pre-requisite(s):

Credit Hours: 3
Contact Hours Through:

| Lecture | Tutorial* | Practical* | Total |
|---------|-----------|------------|-------|
| 2.5 | 0.0 | 1.5 | 4.0 |

 * 1.5 hours for **either** Tutorial or Practical

Approval date of course specification:[September 2014]

## II. Overall Aims of Course

Individual or small group studies of special areas of OR which fit into students' programs of study and which may not be covered by other OR courses. Furthermore, course serves as a vehicle for introducing new or specialized topics at introductory graduate level.

## III. Program ILOs covered by course

| Program Intended Learning Outcomes (By Code) | | | |
|---|---|---|---|
| Knowledge & Understanding | Intellectual Skills | Professional Skills | General Skills |
| [K19,K22,K23] | [I9,I12,I14] | [P15,P16] | [G2,G6,G8,G9] |

## IV. Intended Learning Outcomes of Course (ILOs)

### a. Knowledge and Understanding

On completing the course, students should be able to:

- K.1 Explain knowledge of informal and formal modeling skills.
- K.2 Differentiate between different models and algorithms used in operations research.
- K.3 Illustrate and appreciate the capabilities and limitations of deterministic models in operations research.

### b. Intellectual/Cognitive Skills

On completing the course, students should be able to:

- I.1 Build, analyze, and reason logically with mathematical models.
- I.2 Propose and integrate with large-scale models.
- I.3 Integrate skills to design and analyze algorithms, and to distinguish good algorithms from not-so good ones.

### c. Practical/Professional Skills

On completing the course, students should be able to:

- P.1 Inject knowledge of the varied applications of operations research.
- P.2 Problem solving skills using appropriate modeling techniques.

### d. General and Transferable Skills

On completing the course, students should be able to:

- G.1 Enhance written and oralcommunication skills.
- G.2 Enhance team working skills.
- G.3 Learn recent trends in the field of OR and DS.
- G.4 Evaluate critically the recent trends in the field

## V. Course Matrix Contents

| | Main Topics / Chapters | Duration (Weeks) | Course ILOs Covered by Topic (By ILO Code) | | | |
|---|---|---|---|---|---|---|
| | | | **K & U** | **I.S.** | **P.S.** | **G.S.** |
| 1- | Mathematical Programming | 2 | K1,K3 | I1 | | |
| 2- | Linear Programming, LP, Review | 1 | | I1 | P1,P2 | G1,G3,G4 |
| 3- | Network Programming | 2 | K2,K3 | I2 | | G3,G4 |
| 4- | Dynamic Programming | 2 | K1 | I2 | P2 | G3,G4 |
| 5- | Integer Programming | 1 | K1 | I1,I2 | P2 | G3,G4 |
| 6- | Nonlinear Programming | 2 | K1 | I2 | P1,P2 | G3,G4 |
| 7- | Sensitivity Analysis | 1 | | I3 | P1 | G1,G3,G4 |
| 8- | Algorithms and Software | 2 | K3 | | P1,P2 | All |
| | **Net Teaching Weeks** | **13** | | | | |

## VI. Course Weekly Detailed Topics / hours / ILOs

| Week No. | Sub-Topics | Total Hours | Contact Hours | |
|---|---|---|---|---|
| | | | Theoretical Hours | Practical Hours[*] |
| 1 | Introduction to Operations Research | 2.5 | 2.5 | |
| 2 | An Overview of Modeling | 4 | 2.5 | 1.5 |
| 3 | The - Revised Simplex Method and Bounded Variable Simplex Method | 4 | 2.5 | 1.5 |
| 4 | Duality | 4 | 2.5 | 1.5 |
| 5 | Sensitivity Analysis | 4 | 2.5 | 1.5 |
| 6 | Models of Production & Transportation | 4 | 2.5 | 1.5 |
| 7 | Midterm Exam | | | |
| 8 | Network Flow Problems | 4 | 2.5 | 1.5 |
| 9 | Models of Replacement & Allocation | 4 | 2.5 | 1.5 |
| 10 | Path Problems & Recursive Computation | 4 | 2.5 | 1.5 |
| 11 | Binary Variables, logistical equations | 4 | 2.5 | 1.5 |
| 12 | Cutting Stock | 4 | 2.5 | 1.5 |
| 13 | Cutting Planes | 4 | 2.5 | 1.5 |
| 14 | Sample Models, Local and Global Optimum, Convex Function | 4 | 2.5 | 1.5 |
| 15 | Final Exam | | | |
| **Total Teaching Hours** | | **51** | **33** | **18** |

[*] **No Practical/Tutorial during the first week of the semester**

## VII. Teaching and Learning Methods

| Teaching/Learning Method | Selected Method | Course ILOs Covered by Method (By ILO Code) | | | |
|---|---|---|---|---|---|
| | | **K & U** | **Intellectual Skills** | **Professional Skills** | **General Skills** |
| Lectures & Seminars | √ | K1,K2,K3, | | | |
| Tutorials | | | | | |
| Computer lab Sessions | √ | K3 | I1 | P1,P2 | |
| Practical lab Work | | | | | |
| Reading Materials | √ | | I2,I3 | | G3,G4 |
| Web-site Searches | | | | | |
| Research & Reporting | √ | | | P2 | G1,G3,G4 |
| Problem Solving / Problem-based Learning | √ | | | P1,P2 | G3,G4 |
| Projects | √ | | I3 | P1,P2 | All |
| Independent Work | | | | | |
| Group Work | √ | | I3 | P1,P2 | All |
| Case Studies | | | | | |
| Presentations | √ | | I1 | | G1,G |
| Simulation Analysis | | | | | |
| Others (Specify): | | | | | |

## VIII. Assessment Methods, Schedule and Grade Distribution

| Assessment Method | Selected Method | Course ILOs Covered by Method (By ILO Code) | | | | Assessment Weight / Percentage | Week No. |
|---|---|---|---|---|---|---|---|
| | | K & U | I.S. | P.S. | G.S. | | |
| Midterm Exam | √ | K1,K2,K3, | | | G4 | 10% | 7 |
| Final Exam | √ | K1,K2,K3 | | | G4 | 60% | 15 |
| Quizzes | [ ] | | | | | | |
| Course Work | [ ] | | | | | | |
| Report Writing | [ ] | | | | | | |
| Case Study Analysis | √ | | I1,I2 | P1,P2 | All | 15% | 7 |
| Oral Presentations | [ ] | | | | | | |
| Practical | [ ] | | | | | | |
| Group Project | √ | | I3 | | All | 15% | 12 |
| Individual Project | [ ] | | | | | | |
| Others (Specify): | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] | [ ] |

## IX. List of References

| | |
|---|---|
| **Essential Text Books** | • Ronald L. Rardin, Optimization in Operations Research, Prentice Hal, 198 |
| **Course notes** | • PowerPoint Slides |
| **Recommended books** | • T.R. Willemain, Operations Research, vol 43, 1995. |
| **Periodicals, Web sites, etc.…** | • Decision Support System Journal (www.elsevier.com/locate/dsw<br>• www.idsc.gov.eg, www.thinktools.com, www.gams.com,<br>• www.banxia.com, www.decisivetools.com,<br>• www.man.ac.uk/idmp, www.dsseesources.com,<br>• www.dssresources.com, www.visualt.com, http://trueblue.com.au |

## X. Facilities required for teaching and learning

- Teaching Accommodation
- Data Show Facility
- Computer
- Computer Labs

**Course coordinator:** Assoc. Prof. Ihab El Khodary

**Head of Department:** Prof. Mohamed Mostafa Saleh

**Date:** September 2014