**Course Specification**

**(IS 240 Operations Research)**

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| **University:** | Helwan University |
| **Faculty:** | Faculty of Computers & Information |
| **Department:** | Information systems |

**1. Course Data**

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| --- | --- |
| **Code:** | **IS 240** |
| **Course title:** | Operations research |
| **Level:** |  |
| **Specialization:** | General |
| **Credit hours:** | 3 hours |
| **Number of learning units (hours):** | ( 3) theoretical ( ) practical |

**2. Course Objective**

Providing balanced coverage of the theory, applications, and computations of operations research

**3. Intended Learning Outcomes:**

**Knowledge and Understanding**

A19. Discuss the quality, reliability of IT systems.

* + - * 1. A27. Discuss the basic foundations of Mathematics for computing field.
  1. **Intellectual Skills**
     + 1. B1. Differentiate IT problems.
     1. B2. Design IT solutions.
     2. B3. Devise a solution for IT problems.
     3. B7. Reconstruct results analysis.
     4. B12. Create Innovative solutions.
  2. **Professional and Practical Skills**

C22. Perform data analysis.

C24. Devise solutions to problems.

C25. Use of communications tools and technologies.

* 1. **General and Transferable Skills**

D3. Use different Problem Solving techniques.

D6. Show Modeling capability.

**4. Course contents**

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| --- | --- | --- | --- |
| **Topic** | **No. of hours** | **Lecture** | **Tutorial/ Practical** |
| **Chapter 1:  Introduction to Operations Research.**  1.1  Operations Research Models.  1.2  Solving the OR Model.  1.3  Queuing and Simulation Models.  1.4  Art of Modeling.  1.5  More than Just Mathematics. | 6 | 2 | 2 |
| **Chapter 2:  Modeling with Linear Programming**  2.1  Two-Variable LP Model.  2.2  Graphical LP Solution.  2.3  Selected LP Applications. | 6 | 2 | 2 |
| **Chapter 3:  The Simplex Method .**  3.1  LP Model in Equation Form.  3.2  Transition from Graphical to Algebraic Solution.  3.3  The Simplex Method. | 9 | 3 | 3 |
| **Chapter 4:  Duality and Post-Optimal Analysis.**  4.1  Definition of the Dual Problem.  4.2  Primal-Dual Relationships.  4.3  Additional Simplex Algorithms . | 6 | 2 | 2 |
| **Chapter 5:  Transportation Model and its Variants.**  5.1 Definition of the Transportation Model.  5.2  Nontraditional Transportation Models.  5.3  The Transportation Algorithm.  5.4  The Assignment Model. | 6 | 2 | 2 |
| **Chapter 6: Integer Linear Programming**  6.1 Illustrative Applications  6.2 Integer Programming Algorithms  6.3 Traveling Salesperson (TSP) Problem | 6 | 3 | 3 |

**Mapping contents to ILOs**

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| --- | --- | --- | --- | --- |
| Topic | Intended Learning Outcomes (ILOs) | | | |
| Knowledge and understanding | Intellectual Skills | Professional and practical skills | General and Transferable skills |
| **Chapter 1:  Introduction to Operations Research** | A19 | B1 | C22 |  |
| **Chapter 2:  Modeling with Linear Programming** | A27 | B2,B3 | C24,C25 |  |
| **Chapter 3:  The Simplex Method** | A27,A19 | B2 | C22 | D6 |
| **Chapter 4:  Duality and Post-Optimal Analysis.** |  | B7 |  |  |
| **Chapter 5:  Transportation Model and its Variants.** |  | B2,B12 | C24 |  |
| **Chapter 6: Integer Linear Programming** | A19 | B2 | C25 | D3,D6 |

**5. Teaching and Learning Methods**

Lectures

Exercises

Case Studies

**6. Teaching and Learning Methods for students with limited capability**

Using data show

e-learning management tools

**7. Students Evaluation**

**a) Used Methods**

Written Exams to assess Concepts related to Operations research and Papers on case studies shall be submitted by the students during this course.

**b) Time**

Assessment 1: Test1 Week 4

Assessment 2: Test 2 Week 7

Assessment 3: Midterm exam Week 10

Assessment 4: final written exam Week 14

**c) Grades Distribution**

Mid-Term Examination 20%

Final-term Examination 60%

Other types of assessment 20 %

Total 100%

Any formative only assessments

**List of Books and References**

**a) Notes**

Course Notes

**b) Mandatory Books**

Required Book: Taha, H. A., Operations Research: An Introduction, 8/E. University of Arkansas. Prentice Hall, 2002.

**c) Suggested Books**

**d) Other publications**

**Course Coordinator:** Prof. Dr. Turky Sultan

**Chairman of the Department:** Prof. Dr. Yehia Helmy