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| **image001****YAŞAR UNIVERSITYENGINEERING FACULTYINDUSTRIAL ENGINEERING DEPARTMENTCOURSE SYLLABUS** |
| **Course Title** | **Course Code** | **Semester** | **Course Hour/Week** | **Yaşar Credit** | **ECTS** |
| **MATHEMATICAL MODELING AND APPLICATIONS**  | IENG 466 | 7 | **Theory****2** | **Practice****2** | 3 | 4 |
| **Course Type** |
| 1. Compulsory Courses  |  |
| 1.1. Programme Compulsory Courses |  |
| 1.2. University Compulsory Courses (UFND) |  |
| 1.3. YÖK (Higher Education Council) Compulsory Courses |  |
| 2. Elective Courses | **X** |
| 2.1. Program Elective Courses | **X** |
| 2.2. University Elective Courses |  |
| 3. Prerequisites Courses |  |
| 3.1. Compulsory Prerequisites Courses |  |
| 3.2. Elective Prerequisites Courses |  |

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| **Language of Instruction** |  English |
| **Level of Course**   | Associate Degree (Short Cycle) |  |
| Undergraduate (First Cycle) | **X** |
| Graduate (Second Cycle) |  |
| Doctoral Course (Third Cycle) |  |
|  **Prerequisites of the Course (compulsory)** |  |
| **Special Pre-Conditions of the Course** **(recommended)**  |  |

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| **Course Coordinator** |  Adalet Öner | Mail: adalet.oner@yasar.edu.trWeb: <http://aoner.yasar.edu.tr> |
| **Course Instructor(s)** |  Adalet Öner | Mail: adalet.oner@yasar.edu.trWeb: <http://aoner.yasar.edu.tr> |
| **Course Assistant(s)/Tutor (s)** |  | Mail: Web:  |
| **Aim(s) of the Course** | This course is designed to provide students with further knowledge and skills on mathematical modeling and its applications. The aim is to study mathematical models and simple heuristics for selected OR problems. VBA tool is used for implementations of heuristics.  |
| **Learning Outcomes of the Course** | By the end of the course , the students should be able to:1. formulate a mathematical model for Travelling Salesman Problem (TSP)
2. describe the logic underlining the idea in avoiding subtours of TSP
3. describe the simple heuristics to solve TSP
4. formulate a mathematical model for Vehicle Routing Problem
5. describe the basic heuristics to solve Vehicle Routing Problem
6. formulate a mathematical model for Job Shop Scheduling Problem
7. formulate a mathematical model for university course scheduling problem.
8. describe the logic underlinig the idea in “Node Coloring algorithm”
9. describe the basic heuristics for university course scheduling problem
10. formulate a mathematical models for knapsack and assignment problems.
11. describe the basic heuristics for knapsack problem.
12. describe the basic heuristics for assignment problem.
13. describe and implement “Hungarian Method” to solve assignment problem.
14. use computer software efficiently for modeling and solving the problems stated above
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| **Course Content** | The course will cover the following topics: 1. Travelling Salesman Problem
2. Vehicle Routing Problem
3. University Course Scheduling Problem
4. Job Shop Scheduling Problem
5. Knapsack Problem
6. Assignment Problem
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| **COURSE OUTLINE/SCHEDULE (Weekly)**  |
| **Week** | **Topics** | **Preliminary Preparation** | **Methodology and Implementation****(theory,practice, assignment etc)** |
| 1 | Review of Advanced Excel Functions |  |  |
| 2 | Introduction to VBA |  |  |
| 3 | Application of Simple VBA Codes |  |  |
| 4 | VBA Applications in IE |  |  |
| 5 | Traveling Salesman Problem : Problem Definition and Formulation. Solving small scale models |  |  |
| 6 | Traveling Salesman Problem : Solution ideas and basic heuristics |  |  |
| 7 | University Course Scheduling Problem: Problem Definition and Formulation. Solving large scale models |  |  |
| 8 | University Course Scheduling Problem: Solution ideas and basic heuristics.  |  |  |
| 9 | Node Coloring Problem and basic heuristics  |  |  |
| 10 | Knapsack Problem : Problem Definition and Formulation. Solving large scale models.Solution ideas and basic heuristics |  |  |
| 11 | Assignment Problem : Problem Definition and Formulation. Solving large scale models |  |  |
| 12 | Assignment Problem: Solution ideas and basic heuristics. Hungarian Method. |  |  |
| 13 | Presentation of term projects and discussion |  |  |
| 14 | Presentation of term projects and discussion |  |  |

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| **Required Course Material (s) /Reading(s)/Text Book (s)**  | **“Introduction to Operations Research” 9e, by by Frederick S. Hillier and Gerald J. Lieberman (McGraw Hill)** |
| **Recommended Course Material (s)/Reading(s)/Other** |  **1."Operations Research: An Introduction " 8e, by Hamdy Taha  (Prentice Hall)** **2. "Operations Research: Applications and Algorithms "  4e  by Wayne L. Winston (Cengage Learning)** |
| **ETHICAL RULES WITH REGARD TO THE COURSE (IF AVAILABLE)** |
| Plagiarism is intentionally failing to give credit to sources used in writing regardless of whether they are published or unpublished. Plagiarism (**which also includes any kind of cheating in exams)** is a disciplinary offence and will be dealt with accordingly.  |

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| **ASSESSMENT and EVALUATION METHODS:** |
| FINAL EXAM : The exams will include both theoretical and practical sessions. QUIZZES: Quizzes will relate to current and previous topics. A quiz may be given at any time during any class period -- immediately after a lecture, at the beginning or end of a class, etc. There will be no make-up quizzes -- none even later during the same class period. Quizzes will be given only to those students who are present.ATTENDANCE: Keep in mind that this is an occupational course and attendance is important here.Final Grades will be determined based on the regulations of Yaşar University. |