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|  | **ECTS Course Description Form** |
| **PART I ( Senate Approval)** |
| **Offering School**  | *College of Engineering*  |
| **Offering Department** | *Industrial Engineering* |
| **Program(s) Offered to** | *Industrial Engineering* | *Elective* |
| *Computer Engineering* | *Elective* |
| *Civil Engineering / Electrical Engineering* | *Elective* |
| **Course Code**  | *IE 461* |
| **Course Name** | *Advanced Optimization Methods* |
| **Language of Instruction** | *English* |
| **Type of Course** | **Departmental Area Elective** |
| **Level of Course** | Undergraduate |
| **Hours per Week** | **Lecture:** *3 hrs* | **Laboratory:**  | **Recitation:** 1 | **Practical:**  | **Studio:** | **Other:** |
| **ECTS Credit** | *6* |
| **Grading Mode** | *Letter Grade* |
| **Pre-requisites** | *IE 202* |
| **Co-requisites** |  |
| **Registration Restriction** |  |
| **Educational Objective** | *The objective of this course is to teach students various optimization methods in linear, nonlinear, and mixed-integer programming. Students will learn new methods to solve mathematical programming problems arising from different applications.* |
| **Course Description** | *Detailed analysis of various optimization methods, including linear, nonlinear, and mixed-integer programming, dynamic programming, network modeling, and meta-heuristics and their applications on various platforms are given in this course.* |
| **Learning Outcomes**  | **LO1** | * *Familiarity with various optimization methods in linear, nonlinear, and mixed-integer programming*
* *familiarity with network modeling and optimization approaches*
* *familiarity with nonlinear programming algorithms*
* *familiarity with dynamic programming*
* *familiarity with adaptive optimization and meta-heuristics and their applications on various platforms*
 |
| **LO2** |
| **LO3** |
| **LO4** |
| **LO5** |
| **LO6** |
| **n..** |
| **PART II ( Faculty Board Approval)** |
| **Basic Outcomes (University-wide)** | **No.** | **Program Outcomes** | **LO1** | **LO2** | **LO3** | **LO4** | **LO5** | **LO6** |
| **PO1** | **Ability** to communicate effectively and write and present a report in Turkish and English.  | 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸 🗸  |
| **PO2** | **Ability** to work individually, and in intra-disciplinary and multi-disciplinary teams. |
| **PO3** | **Recognition** of the need for life-long learning and **ability** to access information , follow developments in science and technology, and continually reinvent oneself. |
| **PO4** | **Knowledge** of project management, risk management, innovation and change management, entrepreneurship, and sustainable development. |
| **PO5** | **Awareness** of sectors and **ability** to prepare a business plan. |
| **PO6** | **Understanding** of professional and ethical responsibility and **demonstrating** ethical behavior. |
| **Faculty Specific Outcomes** | **PO7** |  |
| **PO8** |  |
| **PO9** |  |
| **PO10** |  |
| **PO11** |  |
| **PO12** |  |
| **Discipline Specific Outcomes (program)** | **PO13** |  |
| **PO14** |  |
| **PO15** |  |
| **PO16** |  |
| **PO17** |  |
| **PO18** |  |
| **Specialization Specific Outcomes** | **PO N….** |  |
| **PART III ( Department Board Approval)** |
| **Course Subjects, Contribution of Course Subjects to Learning Outcomes, and Methods for Assessing Learning of Course Subjects** | **Subjects** | **Week** |  | **LO1** | **LO2** | **LO3** | **LO4** | **LO5** | **LO6** |
| **S1** | 1 | *Introduction* | A1, A3 | A1, A3 | A1, A3 | A1, A3 | A1, A3 |  |
| **S2** | 2-4 | *Network Modeling* | A1, A3 | A1, A3 | A1, A3 | A1, A3 | A1, A3 |  |
| **S3** | 5-8 | *Advanced Linear Programming* | A1, A3 | A1, A3 | A1, A3 | A1, A3 | A1, A3 |  |
| **S4** | 9-12 | *Nonlinear Programming* | A1, A3 | A1, A3 | A1, A3 | A1, A3 | A1, A3 |  |
| **S5** | 13 | *Dynamic Programming* | A1, A3 | A1, A3 | A1, A3 | A1, A3 | A1, A3 |  |
| **S6** | 14 | *Meta-heuristics* | A1, A3 | A1, A3 | A1, A3 | A1, A3 | A1, A3 |  |
| **S7** |  |  |  |  |  |  |  |  |
| **S8** |  |  |  |  |  |  |  |  |
| **S9** |  |  |  |
| **S10** |  |  |
| **S11** |  |  |
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| **Assessment Methods, Weight in Course Grade, Implementation and Make-Up Rules**  | **No.** | **Type** | **Weight** | **Implementation Rule** | **Make-Up Rule** |
| **A1** | **Exam** | 65% | *No electronic devices are allowed in the examinations except for calculators.* | *If an exam is missed, a make-up exam may be granted if student’ absence from the exam is because of a valid and documented excuse.* |
| **A2** | **Quiz** |  |  |  |
| **A3** | **Homework** | 30% | *Submission by the deadline* | *Late homework is penalized by a percentage* |
| **A4** | **Project** | - | *-* | - |
| **A5** | **Report** | - | - | - |
| **A6** | **Presentation** | - | - | - |
| **A7** | **Attendance/ Interaction** | 5% | - | *No compensation, no makeup* |
| **A8** | **Class/Lab./****Field Work** |  | - | - |
| **A9** | **Other** |  |  |  |
| **TOTAL** | **100%** |
| **Evidence of Achievement of Learning Outcomes** | *%70 course attendance and gaining 70% or more on taken exams and other assignmetns.*  |
| **Method for Determining Letter Grade** | *The %70 total attendance is required otherwise student will fail the course due to absenteeism. Letter grades are determined by applying catalogue system on student’s total weighted grade. Following is an example:*≥ 97% A+[93 97) A[90 93) A-[87 90) B+[83 87) B[80 83) B-[77 80) C+[73 77) C[70 73) C-[67 70) D+[60 67) D< 60 F |
| **Teaching Methods, Student Work Load** | **No** | **Method** | **Explanation** | **Hours** |
| ***Time applied by instructor*** |
| **1** | **Lecture** | *(14 weeks) × (3 hrs per week)* | *42* |
| **2** | **Interactive Lecture** |  |  |
| **3** | **Recitation** | *(14 weeks) × (1 hr per week)* | *14* |
| **4** | **Laboratory** |  |  |
| **5** | **Practical** |  |  |
| **6** | **Field Work** |  |  |
| ***Time expected to be allocated by student*** |
| **7** | **Project** |  |  |
| **8** | **Homework** | *(14 weeks) × (2 hrs per week)* | *28* |
| **9** | **Pre-class Learning of Course Material**  | *(14 weeks) × (1 hr per week)* | *14* |
| **10** | **Review of Course Material** | *(14 weeks) × (3 hrs per week)* | *42* |
| **11** | **Studio** |  |  |
| **12** | **Office Hour** | *(14 weeks) × (3 hrs per week)* | *42* |
| **TOTAL** | *182* |
| **IV. PART** |
| **Instructor** | **Name** |  |
| **E-mail** |  |
| **Phone Number** |  |
| **Office Number** |  |
| **Office Hours** |  |
| **Course Materials** | **Mandatory** |  |
| **Recommended** |  |
| **Other** | **Scholastic Honesty** | *Violations of scholastic honesty include, but are not limited to cheating, plagiarizing, fabricating information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students. Any form of scholastic dishonesty is a serious academic violation and will result in a disciplinary action.* |
| **Students with Disabilities** | *Reasonable accommodations will be made for students with verifiable disabilities.* |
| **Safety Issues**  | *The course does not require any special safety precautions.* |
| **Flexibility** | *Circumstances may arise during the course that prevents the instructor from fulfilling each and every component of this syllabus; therefore, the syllabus is subject to change.  Students will be notified prior to any changes.* |