**ITU**

**DERS KATALOG FORMU**

**(Course Catalogue Form)**

| **Dersin Adı:**  Yöneylem Araştırmaları | **Course Name:**  Operations Research |
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| **Kodu (Course Code)** | **Yarıyıl (Semester)** | **Kredisi (Local Credits)** | **AKTS Kredisi (ECTS Credits)** | **Ders Uygulaması, Saat/Hafta** | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Ders (Theoretical)** | **Uygulama (Tutorial/Recitation)** | **Laboratuvar (Laboratory)** |
| BLG368E | 6 | 3 | 5 | 3 | - | - |

| **Bölüm/Program**  **(Department/Program)** | Bilgisayar Mühendisliği / Computer Engineering |
| --- | --- |

| **Dersin Türü**  **(Course Type)** | Temel Mühendislik  (Basic Engineering) | **Dersin Dili (Course Language)** | İngilizce  (English) |
| --- | --- | --- | --- |
| **Ders Zorunluluğu (Course Compulsion)** | | Seçmeli (Elective) | |

| **Dersin Önkoşulları (Course Prerequisites)** | - | | | |
| --- | --- | --- | --- | --- |
| **Dersin Mesleki Bileşene Yüzde Katkısı**  **(Course Category by Content Percentage)** | Temel Bilim  (Basic Science) | Temel Mühendislik (Engineering Science) | Mühendislik Tasarım (Engineering Design) | İnsan ve Toplum Bilim (General Education) |
| 25% | 75% | - | - |

| **Dersin İçeriği (Course Description)** | Nicel Karar Alma; Model Tasarlama ve modelleme felsefesi; lineer programlama ve Simplex Algoritması; Büyük M metodu; İki-Fazlı Simplex Metodu; Dualite ve Hassaslık Analizi; Ulaşım modeli ve çözme yöntemleri; Tamsayı Programlama; Ağ Modelleri; LINDO; LINGO ve GAMS yazılım paketleri |
| --- | --- |
| Quantitative Decision Making; Model Building and Modeling Philosophy; Linear Programming and Simplex Algorithm; Big M Method; The Two-Phase Simplex method; Duality and Sensitivity Analysis; Transportation Models and Solving Methods; Integer Programming, Network Models, LINDO, LINGO and GAMS Software Packages |
| **Dersin Amacı (Course Objective)** | 1. Nicel karar alma metotlarını öğretme 2. İş hayatındaki gerçek problemlerin modellenmesi 3. Sonuçları teknik ve ekonomik açıdan yorumlamak |
| 1. The methods used in quantitative decision making, 2. Formulation of the business (real life) problems by modeling, 3. To interpret the obtained results from technical and economical viewpoints. |
| **Dersin Öğrenme Çıktıları (Course Learning Outcomes)** | 1. Değişik sistemlerde karşılaşılan problemleri formüle edebilme 2. Uğraşılan problemleri etkileyen parametreleri tanımlayacak gerekli veriyi toplayabilme 3. Problemi temsil eden matematiksel modeller oluşturabilme 4. Geliştirilen matematiksel modelleri test edebilme 5. Geliştirilen modeli çözme (Lineer Programlama, Ulaşım, Atama) ve en iyi sonucu bulma 6. Geliştirilen modelleri çözmek için farklı yazılımlar kullanabilme |
| 1. Formulate the problems occurring in different kinds of systems 2. Collect necessary data to determine the parameters affecting the problems dealt with 3. Develop mathematical models that represent the problems dealt with ideally 4. Test the developed mathematical models about their convenience with the real systems 5. Solve the developed models (Linear Programming, Transportation, Assignment) and find the best solution for the problems dealt with 6. Use different software to solve the developed models (Linear Programming, Transportation, Assignment) |

| **Ders Kitabı (Textbook)** | W. L. Winston, 2004. Operations Research: Applications and Algorithms, Brooks/Cole-Thomson Learning |
| --- | --- |
| **Diğer Kaynaklar (Other References)** | Hillier F.S. and Lieberman G.J., 2005. Introduction to Operations Research, McGraw-Hill Int. Ed.-Industrial Engineering Series  Hamdy A. Taha, 2006. Operations Research: An Introduction, Prentice Hall.  Hamdy A. Taha, 2000. Yöneylem Araştırması, 6. Basımdan Çeviri, (Çeviren ve Uyarlayanlar: Ş. Alp Baray ve Şakir Esnaf), Literatür Yayınları: 43.  Ders notları |

| **Ödevler ve Projeler (Homeworks & Projects)** | Problem modelleme ve problemi yazılım paketleriyle çözme |
| --- | --- |
| Modelling a problem and solving the problem using software packages |
| **Laboratuvar Uygulamaları (Laboratory Work)** | - |
| - |
| **Bilgisayar Kullanımı (Computer Use)** | MS Office, LINDO, LINGO, GAMS yazılım paketleri |
| MS Office, LINDO, LINGO, GAMS software packages |
| **Diğer Uygulamalar (Other Activities)** | - |
| - |

| **Başarı Değerlendirme Sistemi**  **(Assessment Criteria)** | **Faaliyetler (Activities)** | **Adedi (Quantity)** | **Değerlendirmedeki Yüzde Katkısı**  **(Effects on Grading by Percentage)** |
| --- | --- | --- | --- |
| **Yıl İçi Sınavları (Midterm Exams)** | 2 | 50% |
| **Kısa Sınavlar (Quizzes)** | - | - |
| **Ödevler (Homework)** | 1 | 10% |
| **Projeler (Projects)** | - | - |
| **Dönem Ödevi/Projesi (Term Paper/Project)** | - | - |
| **Laboratuvar Uygulaması (Laboratory Work)** | - | - |
| **Diğer Uygulamalar (Other Activities)** | - | - |
| **Final Sınavı (Final Exam)** | 1 | 40% |

**DERS PLANI**

**(Course Plan)**

| **Hafta** | **Konu** | **Dersin Çıktıları** |
| --- | --- | --- |
| **1** | OR’a giriş; Temel OR kavramları | 1 |
| **2** | Lineer Programlamaya giriş; Modelleme (LP ile formülasyon) | 1, 2, 3, 4 |
| **3** | Modelleme (LP ile formülasyon); Grafiksel Çözüm (LP ile çözüm) | 2, 3, 4, 5 |
| **4** | Simplex Algoritması (LP ile çözüm) | 5 |
| **5** | Büyük M metodu-İki Fazlı Simplex Metodu | 5 |
| **6** | Dualite - Hassaslık | 2, 3, 4 |
| **7** | Sınıf çalışması | 1-5 |
| **8** | Ulaştırma Problemleri | 1, 2, 3, 5 |
| **9** | LINDO-LINGO yazılım paketleri -MSExcel çözümü | 5, 6 |
| **10** | GAMS yazılım paketi | 5, 6 |
| **11** | Ulaştırma Problemleri | 1, 2, 3, 5 |
| **12** | Sınıf çalışması | 1-5 |
| **13** | Ağ problemleri | 1, 2, 3, 5 |
| **14** | Tamsayı Programlama | 1, 2, 3, 5 |

| **Week** | **Topic** | **Course Outcome** |
| --- | --- | --- |
| **1** | Introduction to OR; Basic OR Concepts | 1 |
| **2** | Introduction to Linear Programming; Modeling (Formulation in LP) | 1, 2, 3, 4 |
| **3** | Modeling (Formulation in LP); Graphic Solution (Solution in LP) | 2, 3, 4, 5 |
| **4** | The Simplex Algorithm (Solution in LP) | 5 |
| **5** | The Big M-Two phase Simplex Method | 5 |
| **6** | Duality-Sensitivity | 2, 3, 4 |
| **7** | Class Study | 1-5 |
| **8** | Transportation problems | 1, 2, 3, 5 |
| **9** | LINDO-LINGO software packeges-MSExcel solve | 5, 6 |
| **10** | GAMS software package | 5, 6 |
| **11** | Transportation problems | 1, 2, 3, 5 |
| **12** | Class Study | 1-5 |
| **13** | Network problems | 1, 2, 3, 5 |
| **14** | Integer programming | 1, 2, 3, 5 |

**DERSİN BİLGİSAYAR MÜHENDİSLİĞİ ÖĞRENCİ ÇIKTILARI İLE İLİŞKİSİ**

**Relationship between the Course and Student Outcomes**

**(1: “Little”, 2: “Partial”, 3: “Full”, Leave blank if your answer is “None”)**

| **Computer Engineering Department Program Outcomes and Performance Criteria** | | **Level of Contribution** | | |
| --- | --- | --- | --- | --- |
| **1** | **2** | **3** |
| 1 | an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics |  | X |  |
| 2 | an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors |  | X |  |
| 3 | an ability to communicate effectively with a range of audiences |  |  |  |
| 4 | an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts |  |  |  |
| 5 | an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives |  |  |  |
| 6 | an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions |  | X |  |
| 7 | an ability to acquire and apply new knowledge as needed, using appropriate learning strategies |  |  |  |

**HAZIRLANMA BİLGİSİ**

**Edition Information**

| **Prepared by** | **Date** | **Signature** |
| --- | --- | --- |
| **Çiğdem Altın Gümüşsoy** | **01.01.2019** |  |
| **Approved by** | **Date** | **Signature** |
| **Dr.Tolga Ovatman** | **26.11.2020** |  |