**ITU**

**DERS KATALOG FORMU**

**(Course Catalogue Form)**

| **Dersin Adı:**  Gerçek Zaman Sistemlerinde Yazılım | **Course Name:**  Real Time System Software |
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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)** |
| BLG450E | 8 | 2 | 4 | 2 | - | - |

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

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

| **Dersin Önkoşulları (Course Prerequisites)** | BLG312/E Computer Operating Systems | | | |
| --- | --- | --- | --- | --- |
| **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) |
| 30% | 30% | 40% | - |

| **Dersin İçeriği (Course Description)** | Gerçek-Zaman Sistemlerine giriş, Gerçek-Zamanlı Gömülü Sistemler, Sert / Yumuşak Gerçek Zaman Sistemleri, Referans modeli ve performans kriterleri,  periyodik ve periyodik olmayan işler, Gerçek-zamanlı planlamacılar, saat odaklı planlama, öncelik odaklı planlama, aperiyodik işler için planlama, Gerçek-zamanlı uygulamalar, Gerçek-zamanlı işletim sistemlerine giriş, programlama dilleri ve araçları. |
| --- | --- |
| Introduction to Real-Time Systems, Embedded Real-Time Systems, Hard/Soft Real-Time Systems, Reference model and performance criteria, periodic and aperiodic jobs, real-time schedulers, clock-driven scheduling, priority-driven scheduling, scheduling for aperiodic jobs, real-time applications, introduction to real-time operating systems, programming languages and tools. |
| **Dersin Amacı (Course Objective)** | 1. Temel gerçek zamanlı sistemlerin kavramlarını, yazılım sorunları içeriğinde tanıtmak. 2. Gerçek zamanlı sistemler için zamanlama algoritmaları tanımlamak ve tasarım ve analizin temellerini tanıtmak. 3. Gerçek-zamanlı programlama teknikleri ve dilde temel bilgiyi vermek. 4. Gerçek-zamanlı işletim sistemlerini tanıtmak. |
| 1. To introduce basic real time systems concepts in the content of software issues 2. To define scheduling algorithms for real-time systems and to introduce fundamentals for design and analysis 3. To give basic knowledge in real-time programming techniques and languages 4. To introduce real-time operating systems |
| **Dersin Öğrenme Çıktıları (Course Learning Outcomes)** | 1. Gerçek-zamanlı sistemlerin yazılım komponentlerini ve tekniklerini anlamak 2. Gerçek-zamanlı sistemler ve uygulamaların tasarlayabilme |
| 1. To understand software components and techniques of real-time systems 2. To be able to design real-time systems and applications |

| **Ders Kitabı (Textbook)** | Alan Burns, Andy Wellings, 2001, Real-Time Systems and Programming Languages, 3rd Edition,, Prentice-Hall. |
| --- | --- |
| **Diğer Kaynaklar (Other References)** | G M Krishna and K G Shin, 1997, Real-Time Systems, McGraw Hill.  Jane Liu, 2000, Real-Time Systems, Prentice Hall.  Qing Li and Caroline Yao, 2003, Real-Time Concepts for Embedded Systems, CMP Books |

| **Ödevler ve Projeler (Homeworks & Projects)** | - |
| --- | --- |
| - |
| **Laboratuvar Uygulamaları (Laboratory Work)** | - |
| - |
| **Bilgisayar Kullanımı (Computer Use)** | - |
| - |
| **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)** | 1 | 25% |
| **Kısa Sınavlar (Quizzes)** | - | - |
| **Ödevler (Homework)** | 3 | 15% |
| **Projeler (Projects)** | - | - |
| **Dönem Ödevi/Projesi (Term Paper/Project)** | 1 | 20% |
| **Laboratuvar Uygulaması (Laboratory Work)** | - | - |
| **Diğer Uygulamalar (Other Activities)** | - | - |
| **Final Sınavı (Final Exam)** | 1 | 40% |

**DERS PLANI**

**(Course Plan)**

| **Hafta** | **Konu** | **Dersin Çıktıları** |
| --- | --- | --- |
| **1** | Gerçek zamanlı sistemlerin özellikleri, tanımları | 1 |
| **2** | Gerçek-zamanlı sistemler kavramlarının tanıtımı | 1 |
| **3** | Iş planlaması sınıflandırılması | 1, 2 |
| **4** | Saat güdümlü görev zaman ataması sistemlerinin tanımı | 1, 2 |
| **5** | Periyodik işler için öncelik güdümlü zaman atayıcılar | 1, 2 |
| **6** | Periyodik olmayan işlerin öncelik güdümlü sistemlerde zamanlanması | 1, 2 |
| **7** | Gerçek-zamanlı programalama dillerinin ortak özellikleri | 1 |
| **8** | Bir Gerçek-zamanlı programalama diline giriş | 1 |
| **9** | Gerçek-zamanlı programalamada özel konular | 1 |
| **10** | İstisnalar ve istisnalarla başa çıkma | 1, 2 |
| **11** | Eşzamanlı programlama | 1, 2 |
| **12** | Programlamada senkronizasyon ve haberleşme | 1, 2 |
| **13** | Gerçek-zamanlı sistemlerin ortak özellikleri | 1, 2 |
| **14** | Gerçek-zamanlı işletim sistemi örnekleri | 1, 2 |

| **Week** | **Topic** | **Course Outcome** |
| --- | --- | --- |
| **1** | Features of real-time systems, definitions | 1 |
| **2** | Introducing real-time systems concepts | 1 |
| **3** | Classification of job scheduling | 1, 2 |
| **4** | Definition, advantages and disadvantages of clock driven task scheduling algorithms | 1, 2 |
| **5** | Priority driven scheduling for periodic tasks | 1, 2 |
| **6** | Scheduling aperiodic tasks in priority driven systems | 1, 2 |
| **7** | Common features of real-time programming languages | 1 |
| **8** | Introduction to a real-time programming language | 1 |
| **9** | Essential concepts in real-time programming | 1 |
| **10** | Exceptions and exception handling | 1, 2 |
| **11** | Concurrent programming | 1, 2 |
| **12** | Synchronization and communication in programming | 1, 2 |
| **13** | Common features of real-time operating systems | 1, 2 |
| **14** | Examples of real-time operating systems | 1, 2 |

**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 |  |  |  |
| 7 | an ability to acquire and apply new knowledge as needed, using appropriate learning strategies |  | X |  |

**HAZIRLANMA BİLGİSİ**

**Edition Information**

| **Prepared by** | **Date** | **Signature** |
| --- | --- | --- |
| **Doç.Dr.Turgay Altılar** | **26.11.2010** |  |
| **Approved by** | **Date** | **Signature** |
| **Dr.Tolga Ovatman** | **03.12.2020** |  |