**ITU**

**DERS KATALOG FORMU**

**(Course Catalogue Form)**

| **Dersin Adı:**  Paralel ve Dağıtılmış Sistem Programlama | **Course Name:**  Programming in Parallel in Distributed Systems |
| --- | --- |

| **Kodu (Course Code)** | **Yarıyıl (Semester)** | **Kredisi (Local Credits)** | **AKTS Kredisi (ECTS Credits)** | **Ders Uygulaması, Saat/Hafta** | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Ders (Theoretical)** | **Uygulama (Tutorial/Recitation)** | **Laboratuvar (Laboratory)** |
| BLG449E | 7 | 2 | 5 | 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)** | Paralel Hesaplamanın temelleri, paralel mimariler ve ölçeklenebilirlik, sistem ba haberleşmesi, paylaşımlı bellek modelleri, dağıtık bellek modeli, dağıtık hesaplamalı modellerde algoritma tasarımı; haberleşme, senkronizasyon, sistem gereksinimleri ve gelişmiş işletim sistemi konuları bağlamında paralel ve dağıtık sistemlerin karşılaştırılması |
| --- | --- |
| Basics of parallel computing, parallel architectures and scalability, system interconnections and communication, shared memory models, distributed memory model, distributed computing models algorithm design, parallel and distributed platform comparisons considering communication, synchronization, system wide requirements and advanced operating systems issues. |
| **Dersin Amacı (Course Objective)** | 1. Temel parallel ve dağıtık sistem yapılarının öğretilmesi 2. Paralel programların analizi, tasarımı ve gerçeklen mesi için gerekli metotların öğretilmesi 3. Çok işlemcili sistem programlama modellerinin ve tekniklerinin öğretilmesi |
| 1. To teach basic parallel and distributed systems structures 2. To teach methods to analyze, design and implement parallel programs 3. To teach multi-processor system programming models and techniques |
| **Dersin Öğrenme Çıktıları (Course Learning Outcomes)** | 1. Paralel ve dağıtık sistemleri, bileşenlerini ve tekniklerini anlama 2. Paralel ve dağıtık sistemleri ve uygulamalarını tasarlayabilme 3. Çok işlemcili ortamda programlayabilme |
| 1. To understand parallel and distributed systems, components and techniques 2. To be able to design parallel and distributed systems and applications 3. To be able to program multiprocessor environment |

| **Ders Kitabı (Textbook)** | A Grama, G Karypis, V Kumar, A Gupta, 2003, Introduction to Parallel Computing,  2nd Ed., Addison-Wesley.  G Coulouris, J Dollimore, T Kindberg, 2001, Distributed Systems 3rd Ed.,, Addison-Wesley. |
| --- | --- |
| **Diğer Kaynaklar (Other References)** | B Wilkinson, M Allen, 2004, Parallel Programming, 2nd Ed., Prentice-Hall.  P.S. Pacheco, 1997, Parallel Programming with MPI, Morgan Kauffman.  R Chandra et.al, 2001, Parallel Programming in OpenMP, Morgan Kauffman. |

| **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)** | 1 | 20% |
| **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** | Giriş, paralel ve dağıtık sistemlerin genel tanımı | 1 |
| **2** | Paralel hesaplamanın sınıflandırılması | 1 |
| **3** | Çok işlemcili sistemlerin topolojik yapıları | 1, 2, 3 |
| **4** | İşlem, görev, iplik, işlemci, veri/işlem çözümlemesi, | 1, 2, 3 |
| **5** | Paralel çalışan işlemlerin özellikleri, | 1, 2, 3 |
| **6** | Mesaj iletimli ortamında programlamaya giriş, | 1, 2, 3 |
| **7** | Mesaj iletimli ortamlarda özel haberleşme işlemleri | 1, 2, 3 |
| **8** | Mesaj iletimli ortamlarda grup haberleşmesi, | 1, 2, 3 |
| **9** | Paylaşımlı bellek ortamında programlama ve uygulama geli ştirme | 2, 3 |
| **10** | Ağ tabanlı sistemler, dağıtık sistem örnekleri ve özellikleri, | 1, 2, 3 |
| **11** | Paralel ve dağıtık sistem türleri, temel türler | 1, 2 |
| **12** | Dağıtık sistemler için haberleşme konuları | 1, 2 |
| **13** | İnternet protokolü, istemci, sunucu haberleşmesi | 1, 2, 3 |
| **14** | Saat, olay ve işlem durumları | 1, 2, 3 |

| **Week** | **Topic** | **Course Outcome** |
| --- | --- | --- |
| **1** | Introduction, general definitions on parallel and distributed systems | 1 |
| **2** | Classification of parallel computing | 1 |
| **3** | Topological structures of multiprocessing systems | 1, 2, 3 |
| **4** | Process, task, thread, processor, data/process decomposition | 1, 2, 3 |
| **5** | Defining features of process to run in parallel | 1, 2, 3 |
| **6** | Introduction to programming in message passing environments | 1, 2, 3 |
| **7** | Essential communication operations in message passing environments | 1, 2, 3 |
| **8** | Group communication in message passing environments | 1, 2, 3 |
| **9** | Programming and application development in a shared memory environment. | 2, 3 |
| **10** | Network based systems | 1, 2, 3 |
| **11** | Parallel and distributed System types | 1, 2 |
| **12** | Communication topics for distributed systems | 1, 2 |
| **13** | Application program interface for interprocess Internet protocol, client-server communication, | 1, 2, 3 |
| **14** | Clock, event and process states | 1, 2, 3 |

**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** |
| --- | --- | --- |
| **Dr.Tolga Ovatman** | **03.12.2020** |  |
| **Approved by** | **Date** | **Signature** |
| **Dr.Tolga Ovatman** | **03.12.2020** |  |