|  |  |  |
| --- | --- | --- |
| المملكة العربية السعودية  وزارة التعليم العالي  **جامعة أم القرى**  الكلية الجامعية بالجموم – قسم الحاسب الآلي |  | Kingdom of Saudi Arabia  Ministry of Higher Education  **Umm Al-Qura University**  University College in Al-Jamoum  Computer Dept. |

Course Specification

1. **Course number and name:** (2316434-3) Parallel and Distributed Systems
2. **Credits and contact hours:** 3Credits

(Lecture: 3/week – Practical Session: Non)

1. **Instructor’s or course coordinator’s name:** Dr. Kheir Eddine Bouazza
2. **Text books**
3. **Main Text book:** Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems: Principles and Paradigms, Prentice Hall, 2nd Edition, 2006.
4. **Reference:** Lin & Snyder, Principles of Parallel Programming, Addison-Wesley, 2008.
5. **Specific course information**
6. **brief description of the content of the course (Catalog Description):**

This course introduces the principles, design and implementation of parallel and distributed systems. The lectures focus primarily on the principles and design of parallel and distributed systems, cover communication, distributed storage, naming, synchronization, fault tolerance, peer-to-peer systems and data centers. Developing a distributed systems middleware that provides high performance in large scale distributed and networked environment is discussed.

1. **prerequisites or co-requisites:** Operating Systems (2316411-3)
2. **indicate whether a required, elective, or selected elective course in the program:** required
3. **Specific goals for the course**

The student will be able to:

1. Explain what a distributed system is and why one would design a system as a distributed system,
2. Design a distributed system to benefit from its architecture in terms of performance, reliability and availability.
3. Adapt and design algorithms for execution in parallel and distributed settings, analyze the algorithms for correctness, reliability, security, and performance and to solve deadlocks problems in distributed systems.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Course*  *Goals* | *Program Outcomes* | | | | | | | | | | |
| SOa | SOb | SOc | SOd | SOe | SOf | SOg | SOh | SOi | SOj | SOk |
| 1 | ✓ | ✓ | ✓ |  |  |  |  |  | ✓ | ✓ |  |
| 2 | ✓ | ✓ | ✓ |  |  |  |  |  | ✓ | ✓ | ✓ |
| 3 | ✓ | ✓ | ✓ |  |  |  |  |  | ✓ | ✓ | ✓ |

|  |  |
| --- | --- |
| **Relationship of Course Goals to the Program Student Outcomes** | |
| **SOa** | An ability to apply knowledge of computing and mathematics appropriate to the discipline   * *Students are required to have a good understanding and knowledge of principles of developing parallel programs to complete assessments.* |
| **SOb** | An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution.   * *Students will learn about the trade-offs in different parallel architectures, and their implication on execution performance of software with different execution characteristics.* |
| **SOc** | An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs.   * *Students are required design and implement a software project to meet a specification.* |
| **SOi** | An ability to use current techniques, skills, and tools necessary for computing practices.   * *Students will use current parallel programming tools and APIs in homework assignments and their project.* |
| **SOj** | An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices.   * *Students are required to apply their knowledge of computing to design a solution to a problem and to document the solution including the tradeoffs involved in their design choices.* |
| **SOk** | An ability to apply design and development principles in the construction of software systems of varying complexity.   * *The students are required to use standard design and development principles on a parallel programming project.* |

1. **Brief list of topics to be covered**

* Introduction to parallel and distributed systems
* Distributed systems architecture
* Methods of communication in distributed systems
* Coordination in distributed systems
* Synchronization in distributed systems
* Deadlocks in distributed systems