The University of Jordan

Accreditation & Quality Assurance Center

COURSE Syllabus

1	Course title	Parallel Processing
2	Course number	1901464
3	Credit hours (theory, practical)	3
	Contact hours (theory, practical)	0
4	Prerequisites/corequisites	Operating System (1901473)
5	Program title	CS
6	Program code	1
7	Awarding institution	The University of Jordan
8	Faculty	IT
9	Department	CS
10	Level of course	3
11	Year of study and semester (s)	2019, Fall
12	Final Qualification	BS.C
13	Other department (s) involved in teaching the course	-
14	Language of Instruction	English
15	Date of production/revision	-
16	Required/ Elective	Required

16. Course Coordinator:

Prof. Riad Jabri
06-5355000

17. Other instructors:

18. Course Description:

Introduction to high-performance computing, processor architectures, memory systems, data and parallel decompositions, parallel languages and architectures, multiprocessors, multi-computers; routing topologies; shared memory and passage passing parallel processing, PRAM model (exclusive versus concurrent reads and writes) and sample applications.

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2. 19. Course aims and outcomes:

3.

A- Aims:
The Goal:
The main goal of this course is to equip students with knowledge and skills on how parallel architecture and how parallel algorithm could be run on different parallel architecture. That includes languages and tools.

Objectives
Enable students to:

1. To provide a thorough treatment of the concepts, design principles, implementation, and performance issues of contemporary Parallel and Distributed Computing.
2. To illustrate the structure of Parallel and Distributed Systems.
3. To illustrate the design and implementation of parallel algorithms for various problems such as sorting, matrix multiplication and graphs.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

Successful completion of this course enables a student to:
A- Knowledge and Understanding:
A1) Know and Understand the basic concepts of parallel system.
A2) Understand how does parallel systems manage resources such as CPU and memory interleaving concept.
B- Cognitive and Intellectual skills:
B1) Analyze and recognize the significance of several processor communication techniques
B2) Analyze and recognize the significance of several synchronization techniques for data coherency.
B3) Design parallel algorithm out of serial one.
C- Subject specific skills – with ability to …
C1) Implement parallel algorithm using parallel programing based threading.
C2) Implement typical parallel example for data coherency-semaphores..
D- Transferable skills – with ability to
D1) Discuss and work in a group in order to design and implement simple parallel algorithm.
D2) Present a demo for the design, implementing and testing of class project.

20. Topic Outline and Schedule:

4.

Topic	Week		Achieved ILOs	Evaluation Methods	Program SOs[1]
Introduction: Cost versus Performance; What is Parallel Processing? The Scope of Parallel Processing; Issues in Parallel Processing.	**1,2**		A1, A2	Quiz and Exam	1,2
Models of Parallel Computers A Taxonomy of Parallel Architectures; An Idealized Parallel Computer; Dynamic Interconnection Networks; Static Interconnection Networks; Routing Mechanisms for Static Networks; and Communication Costs	**3,4,5**		A1, A2,B1,B2	5. Quiz and programming assignments Midterm Exam	1,2,3,4,5

[1] The ABET outcomes

in Static Interconnection Networks.					
Basic Communication Operations Assumptions in Store-and-Forward and Cut-Through Routing Schemes; Simple Message Transfer between Two Processors; One-to-All Broadcast and All-to-All Broadcast.	**6,7,8**		A1,A2, B1,B3	6. Quiz and programming assignments	1,2,3,4,5
Performance and Scalability of Parallel Systems Performance Metrics for Parallel Systems (run time, speedup, efficiency and cost); The Effect of Granularity and Data Mapping on Performance.	**10,11,12**		B1,B2,C1,C2	7. Quiz	1,2
Dense Matrix Algorithms Mapping Matrices onto Processors (Dense versus Sparse Matrices, Striped Partitioning).	**13,14**		B3,C1,C2,D1, D2	8. Quiz and programming assignments	1,2,4,5
Review	**15**				
Final Exam	**16**				

21. Teaching Methods and Assignments:

Teaching (T) Strategies: Class Contact is 3 Hours per week. The Course will be delivered using different means like lecture, presentations, seminars, discussion and case studies.

Learning (L) Methods: Students attend classes, ask questions and participate in discussions, do the home works, present the assignments and demo their works. A student will use the lab and pre-select a programming language to implement the assignments. Students will access the e-learning platform for more instruction and supported learning materials.

22. Evaluation Methods and Course Requirements:

Assessment (A) Methods: There will be several assessment methods of evaluation the performance of the students such as attending and class participation, grading the homework, quizzes and assignments; conducting the Midterm and the Final Exams. Every student is expected to completely adhere to the assignments and project strict deadlines, absolutely no exceptions will be given.

23. Course Policies:

The honour code applies to all work turned in for this course including exams and assignments. It is important that you understand the solutions to all problems, and the best way to gain an understanding is to work them out and write them up by yourself. Hence the policy is that you must submit your own work and clearly list your references. You may not share your work with other students, unless it is allowed as group. Violating the policy will be taken as a no submission state for the assignment. University regulations will be preserved at all times.

24. Required equipment:

N/A

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Text book (TB):

Introduction to Parallel Computing, by Ananth Grama, Anshul Gupta, George Karypis, and Vipin Kumar, Addison-Wesley an imprint of Pearson Education, Second Edition, 2003. (**http://www-users.cs.umn.edu/~karypis/parbook/**).

References:

1. **Introduction to Parallel Computing Design and Analysis of Algorithms**, by Vipin Kumar, Ananth Grama, Anshul Gupta, and George Karypis, The Benjamin/Cummings Publishing Company, Inc. 1994.
2. **Parallel Programming in C with MPI and OpenMP,** by Michael J. Quinn, Mc Graw Hill, 2003.
3. **Fundamentals of Parallel Processing**, by Harry F. Jordan and Gita Alaghband, Prentice Hall and Pearson Education, 2003.
4. **Advanced Computer Architecture: Parallelism, Scalability, Programmability**, by Kai Hwang, McGraw-Hill Higher Education, First Edition, 1992.
5. www.linux.org/

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N/A

Name of Course Coordinator: ----------Signature: ---------- Date: ----------

Head of curriculum committee/Department: ---------- Signature: ----------

Head of Department: ---------- Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------

Dean: ---------- -Signature: ----------

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Head of Department
Assistant Dean for Quality Assurance
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