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)**: Spring

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. Saleh H Al-Sharaeh - ssharaeh@ju.edu.jo
06-5355000 Ext. 22576

**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 message passing parallel processing, PRAM model (exclusive versus concurrent reads and writes) and sample applications.

1. 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:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Week</th>
<th>Instructor</th>
<th>Achieved ILOs</th>
<th>Evaluation Methods</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Introduction: Cost versus Performance; What is Parallel Processing? The Scope of Parallel Processing; Issues in Parallel Processing.</td>
<td>1,2</td>
<td>Prof. Saleh Al-Sharaeh</td>
<td>A1, A2</td>
<td>Quiz and Exam</td>
<td>Mentioned Below</td>
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<tr>
<td>Models of Parallel Computers</td>
<td>3,4,5</td>
<td>Prof. Saleh Al-Sharaeh</td>
<td>A1, A2,B1,B2</td>
<td>5. Quiz and Exam</td>
<td>Mentioned Below</td>
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### Networks.

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<tr>
<th><strong>Basic Communication Operations</strong></th>
<th><strong>Assumptions in Store-and-Forward and Cut-Through Routing Schemes:</strong></th>
<th><strong>Simple Message Transfer between Two Processors; One-to-All Broadcast and All-to-All Broadcast.</strong></th>
<th><strong>Prof. Saleh Al-Sharaeh</strong></th>
<th><strong>A1, A2, B1, B3</strong></th>
<th><strong>6. Quiz and Exam</strong></th>
<th><strong>Mentioned Below</strong></th>
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<tr>
<th><strong>Performance and Scalability of Parallel Systems</strong></th>
<th><strong>Performance Metrics for Parallel Systems (run time, speedup, efficiency and cost); The Effect of Granularity and Data Mapping on Performance.</strong></th>
<th><strong>Prof. Saleh Al-Sharaeh</strong></th>
<th><strong>B1, B2, C1, C2</strong></th>
<th><strong>7. Quiz and Exam</strong></th>
<th><strong>Mentioned Below</strong></th>
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<tr>
<th><strong>Dense Matrix Algorithms</strong></th>
<th><strong>Mapping Matrices onto Processors (Dense versus Sparse Matrices, Striped Partitioning).</strong></th>
<th><strong>Prof. Saleh Al-Sharaeh</strong></th>
<th><strong>B3, C1, C2, D1, D2</strong></th>
<th><strong>8. Quiz and Exam</strong></th>
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<th><strong>Review</strong></th>
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<td><strong>Final Exam</strong></td>
<td><strong>16</strong></td>
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### 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.

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### 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

25. References:

Text book (TB):


References:
5. www.linux.org/

26. Additional information:

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: ------------------------

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File