

The University of Jordan
School of Engineering
Computer Engineering Department



Fall 2023/2024

Course	Parallel Processing Lab – 0907537 (3 Cr. – Core Course)
Catalog Description	Linux Commands, OpenMP programming, MPI programming, CUDA programming, Java Multi-threading. Speedup and Efficiency Comparison. Parallel Algorithms.
Prerequisites by Course	Parallel Processing (0907536)
Prerequisites by Topic	Students are assumed to have had sufficient knowledge pertaining to SIMD processors, MIMD processors, Parallel Programming, and Synchronization Methods (Barriers, Critical Sections, Locks, Atomic operations).
Textbook	P. Pacheco, An Introduction to Parallel Programming, Morgan Kaufmann, 2011.
References	<ol style="list-style-type: none">1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar., Introduction to Parallel Computing, 2nd edition, 2010.2. D. Culler and J.P. Singh with A. Gupta. Parallel Computer Architecture: A Hardware/Software Approach, Morgan Kaufmann, 1998.3. Michael J. Quinn, Parallel programming in C with MPI and OpenMP, 2003.
Website	Microsoft Teams
Schedule & Duration	15 Weeks, 10 labs, 3 hr. each (including exams)
Student Material	Text book, class handouts, lecture notes, and any additional reading assigned by the instructor
College Facilities	Classroom with whiteboard and projection display facilities, library, and computer laboratory.
Course Objectives	The objectives of this lab are: <ol style="list-style-type: none">1. To gain hands-on parallel programming skills beyond the parallel processing course.2. To become more familiar with Linux environment.3. To apply the knowledge learned from the course into parallelizing an algorithm chosen from other domains such image processing, linear algebra, and scientific computing.
Course Outcomes and Relation to ABET Program Outcomes	Upon successful completion of this lab, a student should be able to: <ol style="list-style-type: none">1. Write, analyze and compare performance of OpenMP, CUDA and Java multi-threading programs [1].2. Work in a team to design a parallel CUDA program for a commonly used algorithm from other domains [7].

Lab Schedule

Lab	Experiment
0	<i>Lab Preparations</i>
1	First Meeting: Syllabus Distribution
2	Exp 1: Linux Commands
3	Exp 2: CUDA Basics Review
4	Exp 3: 2D Arrays in CUDA + Practical Quiz
5	Exp 4: Parallel Reductions in CUDA
6	Exp5: Free Lab
7	Exp 6: CUDA Project Discussions
8	Midterm
9	Exp 7: Java Multi-threading Basics Review
10	Exp 8: Wait/Notify Synchronization in Java Multi-threading
11	Final Exam

1.

Policies

- Attendance is required. Lab attendance will be taken every lab and the university's policies will be enforced in this regard.
- Preparation for each experiment is required before the lab time.
- All submitted work must be yours
- Cheating will not be tolerated

Grading policy

Lab Sheets	20%
Practical Quiz	5%
CUDA Project	15%
Practical Midterm Exam	20%
Final Exam	40%

Instructors

Dr. Fahed Jubair, fjubair@ju.edu.jo
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Class Time and Location

Section 1: Tuesday 1:00-4:00pm, Parallel Processing Lab

Section 2: Thursday 1:00-4:00pm, Parallel Processing Lab

Program Outcomes (PO)

1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
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
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.