



# Course Specifications

Institution:	Majmaah University.
Academic Department :	College of Science at AzZulfi.
Programme:	Computer Science and Information
Course :	Distributed System & Parallel Processing(CSI-421)
Course Coordinator :	Ms. ISSA ALSMADI
Programme Coordinator :	DR.YOSRY AZAAM
Course Specification Approved Date :	23 / 12 / 1435 H



## A. Course Identification and General Information

1 - Course title :	Distributed System & Parallel Processing	Course Code: (CSI-421)
2. Credit hours :	(2 lecture + 2 Laboratory)	
3 - Program(s) in which the course is offered:	Computer Science and Information Program	
4 – Course Language :	ENGLISH	
5 - Name of faculty member responsible for the course:	ISSA ALSMADI	
6 - Level/year at which this course is offered :	8 <sup>th</sup> Level	
7 - Pre-requisites for this course (if any) :	<ul style="list-style-type: none"> <li>• Design &amp; Analysis of Algorithms CSI 321</li> </ul>	
8 - Co-requisites for this course (if any) :	N/A	
9 - Location if not on main campus:	College of Science at AzZulf	
10 - Mode of Instruction (mark all that apply)		
A - Traditional classroom	<input checked="" type="checkbox"/>	What percentage? <b>80 %</b>
B - Blended (traditional and online)	<input checked="" type="checkbox"/>	What percentage? <b>5 %</b>
D - e-learning	<input checked="" type="checkbox"/>	What percentage? <b>5 %</b>
E - Correspondence	<input type="checkbox"/>	What percentage? <b>..... %</b>
F - Other	<input checked="" type="checkbox"/>	What percentage? <b>10 %</b>
Comments :	<p>One-tenth of the course is presented mainly inside video lectures of other instructors worldwide. They illustrate the same topics that I introduced in my lectures with a different presentation.</p>	

## B. Objectives

<p><b>What is the main purpose for this course?</b></p> <p>The objective of this course is to introduce students to the fundamentals and techniques of distributed computing and provide them with the basic skills of how to write distributed programs. Topics to be covered include: distributed computing, distributed programming, distributed systems, concurrency, distributed computing paradigms, inter-process communications, group communications, operating system support, distributed objects, application programming interfaces (RMI, RPC), client server model, the socket API, security issues and Internet applications.</p> <p>In this course also, student will study an introduction to parallel processing. Models of parallel machines. Parallel programming paradigms and models. Performance analysis of parallel systems.</p>
---





Parallel programming languages and frameworks. Students are expected to develop distributed applications using latest technologies.

Briefly describe any plans for developing and improving the course that are being implemented:

1. Using group discussion.
2. Updating the materials of the course to cover the new topics of the field.

## C. Course Description

### 1. Topics to be Covered

List of Topics	No. of Weeks	Contact Hours
<b>1. Introduction</b> The concept of parallel computers and programming, Extension of a single processor system into a shared memory multiprocessor, The message-passing multiprocessor (multicomputer), Static interconnection networks suitable for message-passing multicomputer.	<b>2</b>	<b>8</b>
<b>2. Message Passing Computing -MPI and PVM:</b> Process creation and basic message-passing techniques , Software tools for harnessing a network of workstations, Modeling communication , Communication latency and latency hiding, Time complexity of parallel algorithms.	<b>3</b>	<b>12</b>
<b>3. Performance Measures - Analysis of Parallel Programs:</b>	<b>1</b>	<b>4</b>
<b>4. Embarrassingly Parallel Computations-Simple Data Partitioning:</b> an (ideal) embarrassingly parallel computation 'Embarrassingly parallel problems and analyses , Partitioning a two-dimensional data set, Work pool approach to achieve load balancing , Counter termination algorithm.	<b>2</b>	<b>8</b>
<b>5. Divide-and-Conquer</b> - Pipelined Computations Partitioning and divide-and-conquer concepts as the basis for parallel computing techniques. Tree constructions.	<b>1</b>	<b>4</b>
<b>6. Scheduling and Load Balancing - Synchronous Computations :</b> The concept of a barrier and its implementations (global barriers and local barriers), Data parallel computations, The concept of synchronous iteration, Examples of using global and local barriers.	<b>2</b>	<b>8</b>
<b>7. Shared Memory Programming - Sorting Algorithms :</b> Rank sort , Bubble sort, Odd-even transposition sort, Shear sort, Merge sort, Quicksort, including on a hypercube, Odd-even merge sort,	<b>2</b>	<b>8</b>





Bitonic merge sort.		
<b>8. Numerical Algorithms - Image Processing</b> : Different parallel implementations of matrix multiplication (direct, recursive, mesh), Solving a system of linear equations using Gaussian elimination, Basic low level preprocessing operations (thresholding, contrast stretching, histograms, smoothing, sharpening, noise reduction.	<b>2</b>	<b>8</b>

## 2. Course components (total contact hours and credits per semester):

	Lecture	Tutorial	Laboratory	Practical	Other:	Total
<b>Contact Hours</b>	30	30	-	-	-	60
<b>Credit</b>	30	15	-	-	-	45

## 3. Additional private study/learning hours expected for students per week.

**5 Hours**

The total workload of the student in this course is then:  $60 + 5 \times 15 = 135$  work hours.

## 4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategy

	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
<b>1.0</b>	<b>Knowledge</b>		
<b>1.1</b>	Understand the fundamental aspects of parallel and distributed processing, taxonomies of parallel systems, and performance measures for parallel systems.	Lectures. Lab demonstrations. Case studies.	Written Exam Homework assignments Lab assignments





	NQF Learning Domains And Course Learning Outcomes	Course Teaching Strategies	Course Assessment Methods
1.2	Understand the theoretical limitations of parallel computing such as intractability.	Individual presentations.	Class Activities Quizzes
<b>2.0</b>	<b>Cognitive Skills</b>		
2.1	Design, implement, develop and evaluate efficient parallel application programs.	Lectures. Lab demonstrations.	Written Exam Homework assignments
2.2	Apply the common sort algorithms techniques on data structures types using the MPI.	Case studies. Individual presentations. Brainstorming.	Lab assignments Class Activities Quizzes
<b>3.0</b>	<b>Interpersonal Skills &amp; Responsibility</b>		
3.1	Learn how to search for information through library and internet and Present a short report in a written form and orally using appropriate scientific language.	Small group discussions. Whole group discussions. Brainstorming. Presentations.	Written Exam Homework assignments Lab assignments Class Activities Quizzes
<b>4.0</b>	<b>Communication, Information Technology, Numerical</b>		
4.1	Function effectively on teams to accomplish a common goal, and communicate with teacher, ask questions, solve problems, and use computers.	Small group discussions. Whole group discussions. Brainstorming. Presentations.	Written Exam Homework assignments Lab assignments Class Activities Quizzes
<b>5.0</b>	<b>Psychomotor</b>		
5.1	N/A		





## 5. Schedule of Assessment Tasks for Students During the Semester:

	Assessment task	Week Due	Proportion of Total Assessment
1	First written mid-term exam	6	15%
2	Second written mid-term exam	12	15%
3	Presentation, class activities, and group discussion	Every week	5%
4	Homework assignments	After Every chapter	5%
5	Practical exam	15	20%
6	Final written exam	16	40%
7	Total		100%

## D. Student Academic Counseling and Support

Office hours: Sun: 8-10, Mon. 8-10, Tus. 1-3.

Office call: Mon. 12-1 and Tus 12-1

Email: [i.alsmadi@mu.edu.sa](mailto:i.alsmadi@mu.edu.sa)

## E. Learning Resources

### 1. List Required Textbooks :

Distributed Systems: Concepts and Design (5th Edition) Hardcover – May 7, 2011  
by George Coulouris , Jean Dollimore , Tim indberg , Gordon Blair .  
ISBN-13: 978-0132143011

### 2. List Essential References Materials :

- Distributed Systems: Principles and Paradigms (2nd Edition) by Andrew S. Tanenbaum and Maarten Van Steen (Oct 12, 2006).

### 3. List Recommended Textbooks and Reference Material :

N/A

### 4. List Electronic Materials :





Determines as the course is going on.

#### **5. Other learning material :**

Videos and presentations are available with the instructor.

### **F. Facilities Required**

#### **1. Accommodation**

Classrooms and Labs available at College of science in Zulfi

#### **2. Computing resources**

Smart Board.

#### **3. Other resources**

N/A.

### **G. Course Evaluation and Improvement Processes**

#### **1 Strategies for Obtaining Student Feedback on Effectiveness of Teaching:**

- Analysis of students' results.
- Observation during work.
- Students' evaluations.
- Colleagues' evaluations.
- Evaluation questionnaire filled by the students.
- Interview a sample of students enrolled in the course to take their opinions.

#### **2 Other Strategies for Evaluation of Teaching by the Program/Department Instructor :**

- Self-assessment.
- External evaluation.
- Periodic review of course (the Commission of study plans).

#### **3 Processes for Improvement of Teaching :**

- Taking into account the recommendations yielded from the internal review of the course.
- Guidelines about course teaching provided by the by study plans commission.
- Department Guidelines about faculty member performance on the basis of direct observation.
- Training and development.
- Workshops to improve the educational process.





#### **4. Processes for Verifying Standards of Student Achievement**

- Reviewing the final exam questions and a sample of the answers of the students by others.
- Visiting the other institutions that introduce the same course one time per semester.
- Watching the videos of other courses by international institutions.

#### **5 Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement :**

- Comparison of the course to its counterparts offered in similar departments.
- Periodic revision of course description by faculty member.
- Periodic revision of course description by the study plans and schedules Commission.
- Update learning resources related to the course to ensure that the course is kept up with developments in the field.
- Make use of statistical results of course evaluation made by students to improve and develop the course.
- Giving the opportunity for students to express their opinions about what is taught and receive suggestions and study their effectiveness.

### **Course Specification Approved**

**Department Official Meeting No ( 6 ) Date 23 / 12 / 1435H**

#### **Course's Coordinator**

**Name :** Mr. ISSA ALSMADI

**Signature :** .....

**Date :** 23 / 12 / 1435H

#### **Department Head**

**Name :** Dr YossryAzzam

**Signature :** .....

**Date :** .... / ... / ..... H

