



Course Specifications

Course Title:	Parallel and Distributed Computing
Course Code:	ICS 434
Program:	Information and Computer Science
Department:	Computer Science and Information
College:	College of Science at Az Zulfi
Institution:	Majmaah University

Table of Contents

A. Course Identification	3
6. Mode of Instruction (mark all that apply)	3
B. Course Objectives and Learning Outcomes	4
1. Course Description	4
2. Course Main Objective.....	4
3. Course Learning Outcomes	4
C. Course Content	5
D. Teaching and Assessment	5
1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods	5
2. Assessment Tasks for Students	6
E. Student Academic Counseling and Support	6
F. Learning Resources and Facilities	6
1. Learning Resources	6
2. Facilities Required.....	7
G. Course Quality Evaluation	7
H. Specification Approval Data	8

A. Course Identification

1. Credit hours: (3) (2 Lec + 2 lab)
2. Course type
a. University <input type="checkbox"/> College <input type="checkbox"/> Department <input type="checkbox"/> Others <input type="checkbox"/>
b. Required <input type="checkbox"/> Elective <input checked="" type="checkbox"/>
3. Level/year at which this course is offered: Optional
4. Pre-requisites for this course (if any): Operating systems- ICS 222
5. Co-requisites for this course (if any): N/A

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	80%
2	Blended	6	10%
3	E-learning	0	0%
4	Correspondence	0	0%
5	Other	6	10%

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	15
3	Tutorial	15
4	Others (specify)	-
	Total	60
Other Learning Hours*		
1	Study	15
2	Assignments	15
3	Library	15
4	Projects/Research Essays/Theses	15
5	Others (video lectures)	15
	Total	75

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

1. Course Description

This course aims to introduce the fundamentals of parallel and distributed processing, including system architecture, programming model, and performance analysis. It will focus on the basic architectural, programming, and algorithmic concepts in the design and implementation of parallel and distributed applications. The specific topics include, but not limited to, multithreaded programming, message passing interface, GPU, and cloud computing.

2. Course Main Objective

- To understand the fundamentals of parallel and distributed computing.
- To understand the fundamental questions in parallel and distributed computing.
- To formulate and evaluate a hypothesis by proposing, implementing and testing a project.
- To understand and account for models, limitations, and fundamental concepts in the area of message passing and shared memory concurrency, and apply this understanding to example systems and algorithms.
- To adapt, and design algorithms for execution in parallel and distributed settings, and analyze the algorithms for correctness, reliability, security, and performance.
- To understand different parallel and distributed programming paradigms and algorithms.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	Knowledge:	
1.1	Students will learn about parallel and distributed computers.	K1
1.2	Students will be able to define the behavior of parallel and distributed systems in a rigorous way	K2
1.3	Student will develop and apply knowledge of parallel and distributed computing techniques and methodologies.	
1..		
2	Skills :	
2.1	Student will gain experience in the design, development, and performance analysis of parallel and distributed applications.	S1
2.2	Student will gain experience in the application of fundamental Computer Science methods and algorithms in the development of parallel applications.	S2
2.3		
2...		
3	Competence:	
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.	C2
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction, Parallel and Distributed Computing	4
2	Distributed processing characteristics and processing.	4
3	Parallel architectures, MIMD, SIMD, interconnection topologies.	8
4	Performance measures, speedup, efficiency, limitations of parallel processing.	8
5	Parallel programming paradigms, shared memory, message passing, data parallel, data flow.	8
6	Parallelizing compiler techniques, code and data partitioning.	8
7	Parallel programming environments and tools	4
8	MPI and Teragrid	4
9	Distributed Systems, MapReduce, Clusters	8
10	Distributed Coordination, Security	4
Total		60

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge		
1.1	Students will learn about parallel and distributed computers.	Lectures Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Class & Lab Activities Quizzes
1.2	Students will be able to define the behavior of parallel and distributed systems in a rigorous way		
1.3	Student will develop and apply knowledge of parallel and distributed computing techniques and methodologies.		
1..			
2.0	Skills		
2.1	Student will gain experience in the design, development, and performance analysis of parallel and distributed applications.	Lectures Lab demonstrations Case studies Individual presentations Brainstorming	Written Exam assignments Lab Activities Quizzes
2.2	Student will gain experience in the application of fundamental Computer Science methods and algorithms in		

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
	the development of parallel applications.		
...			
3.0	Competence		
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 discussion Whole group discussion Brainstorming Presentation	Written Exam Homework assignments Lab assignments Class Activities Quizzes
3.2			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First written mid-term exam	6	20%
2	Second written mid-term exam	12	20%
3	Class activities, group discussions, Presentation	Every 2 weeks	5%
4	Homework + Assignments	After Every chapter	5%
5	Electronic exam	14	5%
6	Lab activities	15	5%
7	Final written exam	16	40%
8			

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice. (include amount of time teaching staff are expected to be available each week)

- 6-office hours per week in the lecturer schedule.
- The contact with students by e-mail, mobile, office telephone, website and BlackBoard.

F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	Calvin Lin, Principles of Parallel Programming, Addison-Wesley, 2008 Gerassimos Barlas , Multicore and GPU Programming, Morgan Kaufmann, 2015
---------------------------	--

Essential References Materials	Ian Foster, Cloud Computing for Science and Engineering, MIT Press, 2017
Electronic Materials	https://www.coursera.org/
Other Learning Materials	Videos and presentations made available on BlackBoard e-Learning platform.

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms with required digital aids and to support traditional method of teaching using blackboard. Classrooms with proper lighting and air conditioning system integrated with the sound System /audio system. Classroom with smart board interface, display screen and a computer to aid the sessions
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart Board with supporting software / computers with updated versions of software as required to understand the subject concepts.
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	N/A

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Strategies for Obtaining Student Feedback on Effectiveness of Teaching	Instructor	Analysis of students' results. Observation during class work. Students' evaluations. Colleagues' evaluations. Evaluation questionnaire filled by the students. Interview a sample of students enrolled in the course to solicit their opinions
Other Strategies for Evaluation of Teaching	the Department	Self-assessment. External evaluation. Periodic review of course (the Commission of study plans).
Processes for Improvement of Teaching	the Department	Taking into account the recommendations yielded from the internal review of the course. Guidelines about teaching the course provided by the study plans commission. Department guidelines pertaining the faculty member's performance acquired using direct observation. Training and development.

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Processes for Verifying Standards of Student Achievement	Instructor	Workshops to improve the educational process check marking by an independent member teaching staff of a sample of student work, periodic exchange and remarking of tests or a sample of assignments with staff at another institution. Instructors of the course working together with Head of Department to adopt a unique process of the evaluation.
Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.	Instructor	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 up-to-date with the developments in the field. Make use of statistical analysis of course evaluation carried out by the students to improve and develop the course. Provide an opportunity to the students to express their opinions about what is taught and receive suggestions and evaluate their effectiveness.

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify))

Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	
Reference No.	
Date	