Course Specification
(Bachelor)

Course Title:	Parallel and Distributed Systems
Course Code:	562CCS-3
Program:	Bachelor of Science in Computer Science
Department:	Department of Computer Science
College:	Computer Science and Information Systems
Institution:	Najran University
Version:	2.0
Last Revision Date:	August 2022

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A. General information about the course:

1. Course Identification

1. Credit hours: (3)					
3 (2, 2, 1) [Theory, Lab, Tutorial]					
2. Course type					
A.	☐University	☐College	☒ Department	☐Track	☐Others
B.	☒ Required		☐Elective		
3. Level/year at which this course is offered: (Level 9/Year 5)					
4. Course General Description:					
Introduction to parallel systems; Processes and processors; Parallel architectures (multi-computer, multi-processor); Performance of Parallel systems (speedup, efficiency, etc.); Characterization of distributed systems; System models; Inter-process communication; Remote invocation; Distributed operating system; and Distributed file systems.					
5. Pre-requirements for this course (if any)**:**					
None					
6. Co-requisites for this course (if any)**:**					
None					
7. Course Main Objective(s):					
1. Define the basic concepts and terminologies of parallel and distributed systems. 2. Explain various parallel and distributed computing paradigms and issues. 3. Evaluate the performance issues of parallel, distributed and pipelined computing. 4. Analyze the algorithms of parallel and distributed systems. 5. Apply the knowledge and methods of parallel and distributed systems in programming using Java.					

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	75	100%
2	E-learning		
3	Hybrid • Traditional classroom • E-learning		
4	Distance learning		

3. Contact Hours (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	30
2.	**Laboratory/Studio**	30
3.	**Field**	
4.	**Tutorial**	15
5.	**Others (specify)**	
Total		75

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Define the basic concepts and terminologies of parallel and distributed systems	K_1	1. Lecture: here the instructor addresses verbally in front of students the concepts associated with examples with taking help of writing on the board as needed. 2. Continuous examples: during lecture, the instructor will make many examples by sketching on the board in order to support the	Midterm Exam Final Exam
1.2	Explain various parallel and distributed computing paradigms and issues	K_1, K_2		Midterm Exam Quizzes Final Exam

Code	Course Learning Outcomes	Code of PLOs aligned with the program	Teaching Strategies	Assessment Methods
			demonstration of the concept.	
1.3				
2.0	**Skills**			
2.1	Evaluate the performance issues of parallel, and distributed and pipelined computing.	S_2	Lecture: here teacher is going to convey concepts theoretically and by discussing those using different examples on different situations. 2. Discussions: the instructor here throws an idea to students and asks them to give their viewpoints, as well as, their reasoning regarding it. Also, the instructor may throw a problem to be discussed from various perspectives. 3. Cooperative Learning: instructor will ask students to solve a problem collaboratively and give their proposed solutions to be discussed and evaluated. Lecture: here teacher is going to convey concepts theoretically and by discussing	Midterm Exam Final Exam
2.2	Analyze the algorithms of parallel and distributed systems.	S_1, S_3		Midterm Exam Final Exam
2.3	Apply the knowledge and methods of parallel and distributed systems in programming using java	S_2, S_5		Lab Assessment, Quiz, Final theory exam
2.4				
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				

C. Course Content

No	List of Topics	Contact Hours
1.	Introduction to the parallel system	5

2.	Parallel system architecture	10
3.	Performance of Parallel systems (speedup, efficiency, etc.)	10
4.	Introduction to distributed systems	10
5.	Distributed system models	10
6.	Inter-process communication	10
7.	Remote invocation continue	10
8.	Distributed Operating system	10
Total		**75**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Quizzes	3rd, 5th	10%
2.	Theory Assignments	2nd, 4th	10%
3.	Midterm	9th	20%
4.	Lab Assessments or mini project (presentation)	10th	10%
5.	Lab final Exam	11th	10%
6.	Final Theory	16th or 17th	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.).

E. Learning Resources and Facilities

1. References and Learning Resources

Essential References	1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Introduction to Parallel Computing, Second Edition, second edition, Addison Wesley 2. George Coulouris, Jean Dollimore, Tim Kindberg and Gordon Blair, Distributed Systems Concepts and Design, fifth edition, Addison Wesley
Supportive References	1. William Stallings, Computer Organization and Architecture: Designing for Performance, Eighth Edition, Pearson Prentice Hall, Pearson Education, Inc. Upper Saddle River, New Jersey. 2. Peter Pacheco, An Introduction to Parallel Programming, 2011, Morgan Kaufmann

	3. Andrew S. Tanenbaum, Maarten van Steen, Distributed Systems: Principles and Paradigms, second edition, Prentice Hall.
Electronic Materials	1. https://netbeans.org/downloads/8.2/rc/
Other Learning Materials	2. https://www.javatpoint.com/java-awt 3. https://www.javatpoint.com/java-swing 4. http://tutorials.jenkov.com/javafx/fxml.html

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	Classroom with 30 chairs, whiteboard, podium, wireless projectors, Wi-Fi with good speed
Technology equipment (projector, smart board, software)	• The lecture room should contain a PC attached to the data show device with the latest MS Office and Adobe Acrobat Reader packages being installed. • Laboratory contains enough number of PC to accommodate all students with Java-related software like J Creator, J2SE, NetBeans, Eclipse and JRE licensed versions with network packages should be installed. • PCs in the lab should be installed with licensed antivirus.
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Collecting students' suggestions to facilitate more during the class.	Students	Verbal discussion
Student's questionnaire once during the semester about course learning outcomes.	Students	Indirect Survey
Achievement percentage of course learning outcomes, direct evaluation using CLO assessment sheet	Course Instructor	Direct evaluation using CLO achievement calculation
Teaching strategies	Quality unit	Indirect
Assessment methods	Quality unit	Indirect
Instructor performance	Quality unit	Indirect
Course content	Quality unit	Indirect

Assessors (Students, Faculty, Program Leaders, Peer Reviewers, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	Computer Science Departmental Council
REFERENCE NO.	14440203-0185-00002
DATE	1st Sep, 2022