

1	Course title	<i>Parallel and Distributed Systems</i>
2	Course number	<i>1901468</i>
3	<i>Credit hours (theory, practical)</i>	<i>3</i>
	<i>Contact hours (theory, practical)</i>	<i>0</i>
4	Prerequisites/corequisites	<i>Computer Networks 1(1901361)</i>
5	Program title	<i>CS</i>
6	Program code	<i>1</i>
7	Awarding institution	<i>The University of Jordan</i>
8	Faculty	<i>IT</i>
9	Department	<i>CS</i>
10	Level of course	<i>3</i>
11	Year of study and semester (s)	<i>Fall 2022</i>
12	Final Qualification	<i>BS.C</i>
13	Other department (s) involved in teaching the course	<i>-</i>
14	Language of Instruction	<i>English</i>
15	Date of production/revision	<i>-</i>
16	Required/ Elective	<i>Required</i>

16. Course Coordinator:

Maen Al Assaf e-mail: m_lassaf@ju.edu.jo
Office numbers, 22587 office hours 1-2 PM S,M,TH.

17. Other instructors:

N/A

18. Course Description:

Parallel Systems Architectures .. Distributed system basic concepts: hardware, software, design issues; communication in distributed systems; layered protocols; synchronous vs. asynchronous communication mechanisms; client-server model vs. peer-to-peer model; Remote Method Invocation (RMI) and Remote Procedure Call (RPC); group communication; processes vs. threads; synchronization: physical vs. logical clocks, Lamport clocks, distributed mutual exclusion, election algorithms; distributed transactions; case studies.

19. Course aims and outcomes:

A- Aims:

To learn and Understand the basic concepts associated with distributed systems ,the inter-process communication mechanism (message-passing) the advantages of deploying distributed systems

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to ...

A. Knowledge and Understanding (students should be able to understand):

A1) the basic concepts associated with parallel and distributed systems

A2) the inter-process communication mechanism (message-passing)

A3) the advantages of deploying parallel and distributed systems

A4) Knowledge of topics related to distributed systems: cloud computing, blockchain, IoT

B. Intellectual skills (students should be able to):

B1) distinguish between the parallel and distributed systems models described in class

B2) distinguish between processes and threads

B3) distinguish between different distributed synchronization algorithms

C. Subject specific skills (students should be able to):

C1) Understand Java RMI main APIs

C2) knowledge of inter-process synchronization main APIs

C3) knowledge of address timing main APIs

D. Transferable skills (students should be able to):

D1) make the specification of a designated distributed system component

20. Topic Outline and Schedule

week	lecture	Topic	SO	ILO	Teaching Methods* /platform	Evaluation Methods	Reference
1+2		Characterization of Distributed Systems: <ul style="list-style-type: none"> • Introduction • Examples of distributed systems • Trends in distributed systems • Resource sharing • Challenges 	1,2	A1- A3 D1 B3	Lecture	1. Quiz & Exam	2. Mentioned Below
3+4		System Models <ul style="list-style-type: none"> • Generations of distributed systems • Physical model • Architectural model 	1,2	B1, B2, B3	lecture	3. Quiz & Exam	4. Mentioned Below

		<ul style="list-style-type: none"> Fundamental model 					
5		Networking & Internetworking <ul style="list-style-type: none"> Types of networks Network principles Internet protocols 	1,2	A1, A2	Lecture	5. Quiz & Exam	6. Mentioned Below
6+7		Interprocess Communication <ul style="list-style-type: none"> Introduction The API for the Internet protocols External data representation and marshalling 	1,2, 6	A1-A3 B1	Lecture	7. Quiz & Exam	8. Mentioned Below
8+9		Remote Invocation <ul style="list-style-type: none"> Introduction Request-reply protocols Remote procedure call Remote method invocation 	1,2, 6	A1-A3, B1, C1	Lecture	9. Quiz & Exam	10. Mentioned Below
10+11		Operating Systems Support <ul style="list-style-type: none"> Introduction The operating system layer Protection Processes and threads Communication and invocation 	1,2, 6	A2, B2	Lecture	11. Quiz & Exam	12. Mentioned Below
12+13		Cloud Computing <ul style="list-style-type: none"> Introduction Characteristics Service Models: IaaS, PaaS, and SaaS 	6	A2, A3	Lecture	13. Quiz & Exam	14. Mentioned Below

14		IoT Applications <ul style="list-style-type: none"> • What is IoT? • Need for IoT? • Applications of IoT • Future Scope 	6		Lecture	15. Quiz & Exam	16. Mentioned Below
15		Parallel Computing <ul style="list-style-type: none"> • Cost versus Performance • What is Parallel Computing? • The Scope of Parallel Computing • Issues in Parallel Computing • Models of Parallel Computers 	1,2	A1, A3, B1	Lecture	17. Quiz & Exam	18. Mentioned Below
16		Models of Parallel Computers <ul style="list-style-type: none"> • A Taxonomy of Parallel Architectures • Dynamic Interconnection Networks • Static Interconnection Networks • Evaluating Static Interconnection Networks 	1,2	A1 - A3, B1, C1	Lecture	19. Quiz & Exam	20. Mentioned Below
21							

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 select a programming language to implement the assignments. Students will access the e-learning platform for more instruction and supported learning materials.

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 (30%); conducting the Midterm (30%) and the Final Exam (40%). Every student is expected to completely adhere to the assignments and project strict deadlines, absolutely no exceptions will be given.

23. Course Policies:

No makeup exams will be offered
Students are expected to adhere to assignment strict deadlines and to behave responsibly
Students' acts of cheating and/or plagiarism will be penalized according to the regulations of the University of Jordan

24. Required equipment:

Java development environment

25. References:

A- Required book (s), assigned reading and audio-visuals:

George Coulouris, Jean Dollimore, and Tim Kindberg, Gordom Blair, Distributed Systems Concepts and Design, 5th edition, Addison-Wesley, 2011.

B- Recommended books, materials, and media:

1. A. Tanenbaum, and M. Van Steen, Distributed Systems: Principles and Paradigms, 2nd Edition Prentice-Hall 2006.
2. A. Rubini et al, Linux Device Drivers, 3rd edition, O'Reilly.
3. J. Bacon, Concurrent Systems, 3rd edition, Harlow, England: Addison-Wesley.
4. Kris Jamsa, Cloud Computing , Jones & Bartlett Learning; 2012.

26. Additional information:

N/A

Name of Course Coordinator: Maen AL Assaf Signature: Maen al Assaf Date:25 /1 /2023

Head of curriculum committee/Department: ----- Signature: -----

Head of Department: ----- Signature: -----

Head of curriculum committee/Faculty: ----- Signature: -----

Dean: ----- -Signature: -----