



جمهورية مصر العربية

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research



المعهد العالى للحاسبات وتكنولوجيا المعلومات
مدينة الشروق - القاهرة
شعبة علوم الحاسب

Course specification

Course Code: CS 418

Course Title: Parallel Processing

Academic Year: 2023/2024

Course specification
(CS 418 - Parallel Processing)

Course Outline

Faculty:	<i>HICIT- (Higher Institute for Computers & Information Technology-El Shorouk Academy)</i>		
Programme(s) on which the course is given:	Undergraduate program in Computer Science		
Major or minor element of programme:	Compulsory		
Department offering the program	Department of Computer Science		
Department offering the course:	Department of Computer Science		
Level	fourth Level		
Date of specification approval	/ /2023		

Basic Information

Code:	CS 418	Title:	Parallel Processing	
Prerequisites:	CS 250 Computer Networks			
Weekly Hours:				
Lecture: 2	Exercise:	Practical : 2	Total: 3 credit hours	

Professional Information

Course Aims:

Interconnection networks: parallel computing and networks, direct and indirect networks, message layer, deadlock and live lock and starvation, routing algorithms, collective communication support. Parallel algorithms: BRAM model, basic techniques (balanced tree algorithm, divide and conquer, prefix computations, pointer jumping, partitioning), list and trees (list ranking, symmetry breaking, Euler tour techniques), searching, merging, and sorting algorithms.

After completing this course, the student should be able to:

- Evaluate effectively the merits of networking and internetworking.
- Use all available principles and tools of remote invocation.
- Comprehend deeply the basic concepts of resource sharing and distributed systems.
- Show a complete understanding of inter-process communication.
- Compare and evaluate different physical and architectural models of distributed systems.

a2	Deep understanding the concepts of the different high-level programming languages.
a11	Select advanced topics to provide a deeper understanding of some aspects of object-oriented analysis and design, and software engineering.
a13	Demonstrate strong knowledge of fundamentals of programming and the construction of computer-based systems.
a20	Describe the principals of generating tests which investigate the functionality of computer programs and computer systems and evaluating their results.
b3	Perform classifications of (data, results, methods, techniques, algorithms, etc.).
b4	Identify attributes, components, relationships, patterns, main ideas, and errors.
c1	Use appropriate programming languages and design methodologies.
c5	Specify, design, and implement and manage computer-based systems.
c10	Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.
c16	Apply tools and techniques for the design and development of applications.
d5	Demonstrate efficient IT capabilities.

Program ILOs Covered by Course

Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
A2, A11, A13, A20	B3, B4	C1, C5, C10, C16	D5

Intended learning outcomes of course (ILOs)

a. Knowledge and Under-Standing:

- a1- Discuss the basic concept of modern distributed architectures.
- a2- Identify different modern paradigms of interactions in distributed systems.
- a3- Explain design aspects of distributed applications for particular distributed system architecture and the structural and functional features of distributed systems.

b. Intellectual Skills:

- b1- Analyze the structural and functional differences between classic and modern distributed architectures.
- b2- Invent a distributed application that suits specific architectures.
- b3- Compare and differentiate between networking and internetworking concepts.

c. Professional and practical skills

- c1- Analyze, design and implement distributed processing concepts in developing programs for a distributed system.
- c2- Deploy effective supporting tools for Remote method invocation (RMI).
- c3- Create technical reports according to professional standards in inter-process communication.

d. General and transferable skills

- d1- Work in a team effectively and efficiently considering time and stress management to manipulate methodology.
- d2- Apply communication skills and techniques in presentations and report writing.

Contents		
Topic	Contact Hours	
	lecture	Lab
Characterization of Distributed Systems: Examples and Trends of distributed systems	2	2
Characterization of Distributed Systems: Resource sharing and Distributed systems Challenges	2	2
System models: Physical and Architectural models	2	2
System models: Fundamental models	2	2
Networking and Internetworking: Network principles	2	2
Networking and Internetworking: Internet protocols and Case studies	2	2
Interprocess Communication: API for the Internet protocols- External data representation and marshalling.	2	2
Interprocess Communication: Multicast communication and network virtualization	2	2
Mid Term Exam		
Remote Invocation: Request-reply protocols and remote procedure call.	2	2
Remote Invocation: Remote method invocation (RMI)	2	2
Operating System Support: Protection, Processes and threads, Communication and invocation, and file service architecture.	2	2
Project presentation	2	2
Final Exam		

Teaching and learning methods	
Teaching and learning methods	Used
Lectures	√
Tutorial Exercises	
Practical Lab	√
Discussions.	√
Self – Learning (Reading material, Websites search,)	√
Self-studies	√
Group work	√
Presentation	√
Problem solving/problem solving learning based	√
Case study	√
Synchronous E-Learning	√
Video lectures	√
Asynchronous E-Learning	√

Student assessment methods & Schedule		
Methods	Used	Week#
Midterm Exam	√	8
Final Exam	√	16
Course Project	√	3-14
Course Work & Quizzes	√	2-14
Practical Exam	√	15

Assessment Weight	
Assessment	Weight %
Mid Term Exam	15
Practical Exam and Project	15
Final Exam	60%
Course Work & Quizzes	10%
Total	100

Course Work & Quizzes
Short Exams, Assignments, Research, Reports, Presentations
Class/Project discussion

List of references	
Essential books (textbooks)	
Course notes	An Electronic form of the Course Notes and all the slides of the Lectures is available on the Students Learning Management System (Moodle)
Recommended books	G. Coulouris, J. Dollimore, T. Kindberg, and G. Blair, <i>Distributed Systems: Concepts and Design</i> , latest edition.
Periodicals, website	IEEE Transactions on Parallel and Distributed Systems. https://www.computer.org/web/tpds
Videos link	

Required Facilities		
Tools/Software	- Visual Studio	
Teaching facilities:	Whiteboard	√
	Computer Lab	√
	Data show	√
	E-Learning	√
	Videos	√
	Website	√

Course Content/ILO Matrix

Course Contents	Knowledge & understanding			Intellectual skills			Professional and practical skills			General	
	a1	a2	a3	b1	b2	b3	c1	c2	c3	d1	d2
Characterization of Distributed Systems: Examples and Trends of distributed systems	√										
Characterization of Distributed Systems: Resource sharing and Distributed systems Challenges		√									
System models: Physical and Architectural models		√	√								
System models: Fundamental models											
Networking and Internetworking: Network principles				√	√			√	√		
Networking and Internetworking: Internet protocols and Case studies				√	√		√		√		
Interprocess Communication: API for the Internet protocols- External data representation and marshalling						√	√				
Interprocess Communication: Multicast communication and network virtualization						√	√				
Mid Term Exam	√	√	√	√	√	√				√	
Remote Invocation: Request-reply protocols and remote procedure call.						√				√	
Remote Invocation: Remote method invocation (RMI)						√					
Operating System Support: Protection, Processes and threads, Communication and invocation, and file service architecture.									√		
Project presentation										√	√
Final Exam	√	√	√	√	√	√					

Assessment Methods /ILOs Matrix											
Assessment Methods	Knowledge & understanding			Intellectual skills			Professional & practical skills			General	
	a1	a2	a3	b1	b2	b3	c1	c2	c3	d1	d2
Mid Term Exam	√	√	√	√	√	√					
Final Exam	√	√	√	√	√	√					
Course Project										√	√
Course Work & Quizzes	√	√	√	√	√	√	√	√	√		
Practical Exam				√	√	√	√	√	√		

Learning Method /ILOs Matrix											
Learning Method	Knowledge & understanding			Intellectual skills			Professional & practical skills			General	
	a1	a2	a3	b1	b2	b3	c1	c2	c3	d1	d2
Lectures	√	√	√	√	√	√					
Tutorial Exercises				√	√	√	√	√	√		
Reading material				√	√	√					
Websites search				√	√	√	√	√	√		
Research and reporting				√	√	√	√	√	√		
Problem solving				√	√	√					
Group work										√	√
Case study	√	√	√	√	√	√	√	√	√		
Practical Lab				√	√	√	√	√	√		
Discussions.								√	√	√	√

Course ILOs Vs Program ILOs

Prog ILOs Course ILOs		Knowledge & understanding				Intellectual skills		Professional and practical skills				General
		A2	A11	A13	A20	B3	B4	C1	C5	C10	C16	D5
Knowledge and Understanding	a1	√										
	a2		√	√								
	a3		√	√	√							
Intellectual skills	b1					√	√					
	b2					√	√					
	b3					√	√					
Professional and practical skills	c1							√	√			
	c2									√		
	c3									√	√	
General skills	d1											√
	d2											√

Course Coordinator : Dr. Eng. Mohamed A. Hussein ()

Head of Department : Dr. Ahmed El-Abbassy ()

Date: 3/9/2022