



جمهورية مصر العربية

وزارة التعليم العالي والبحث العلمي

Ministry of Higher Education and Scientific Research



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

Course specification

Course Code: CS 332

Course Title: Real Time Systems

Academic Year: 2023/2024

Course specification
(CS 332 – Real Time Systems)

Course Outline

Faculty: HICIT- (Higher Institute for Computers & Information Technology-El Shorouk Academy)	
Programme(s) on which the course is given:	Undergraduate program in Computer Science
Major or minor element of programme:	Compulsory / Elective
Department offering the program	Department of Computer Science
Department offering the course:	Department of Computer Science
Level	Third Level
Date of specification approval	03/09/2022

Basic Information

Code: CS 332	Title: Real Time Systems		
Prerequisites:	CS 331 Theory of Operating Systems		
Weekly Hours:			
Lecture: 2	Exercise: -	Practical : 2	Total: 3

Professional Information

Course Aims:

- Develop an understanding of various real time systems applications.
- Obtain a broad understanding of the technologies and applications for the emerging and existing domain of real-time systems.
- Obtain a good understanding of scheduling approaches needed for real time systems.
- Get appropriate and hands-on experience in designing and developing a real operational system.
- Obtain a good understanding the A reference model and architecture of real time systems.
- Obtain a good understanding of the real time operating system.
- Obtain a good understanding real time programming languages and design techniques

a15	Select advanced topics to provide a deeper understanding of some aspects of the operating systems, Parallel Processing, Real Time Systems
-----	---

B9	Solve computer science problems with pressing commercial or industrial constraints
B10	Generate an innovative design to solve a problem containing a range of commercial and industrial constraints
c1	Use appropriate programming languages and design methodologies.
C5	Specify, design, implement and manage computer-based systems
D2	Work effectively as an individual and as a member of a team

Program ILOs Covered by Course

Knowledge and understanding	Intellectual Skills	Professional and practical skills	General and Transferable skills
A15	B9, B10	C1, C5	D2

Intended learning outcomes of course (ILOs)

a. Knowledge and Under-Standing:

- a1. Understand the nature of real time system, the description of its components.
- a2. Understand the nature of real time operating system, the description of its components
- a3. Understand the different scheduling approaches, the roles of each.
- a4. Understand the approaches of resources and resource access control.
- a5. Understand the approaches of real time communications and Inter task communication.

b. Intellectual Skills:

- b1. Think over various scheduling techniques, and the value of each of them against overall real time system requirements.
- b2. Think over the overall real time system components defining the role of the real time operating system.
- b3. Evaluate various real time system scheduling approaches defining the role of each.

c. Professional and practical skills

- c1. Propose a real time application defining its components.
- c2. Design a real time application using appropriate design technique.
- c3. Model a real time application.

d. General and transferable skills

- d1. Implement a real time system using appropriate programming language.
- d2. Work with a team to implement a real system application.

Contents

Topic	Contact Hours
-------	---------------

	lecture	Lab
Introduction to real time systems.	2	2
A reference model and architecture of real time systems	2	2
Scheduling commonly used approaches in real time systems: hard real time scheduling,	2	2
Clock-driven scheduling,	2	2
Priority-driven scheduling of periodic tasks/Jobs in Priority-driven systems,	3	3
Scheduling periodic and sporadic tasks.	2	2
Scheduling flexible computations and tasks with temporal distance constraints.	3	3
Multiprocessor scheduling and resource access control and Synchronization.	2	2
Real time operating system;	2	2
Resources and resource access control.	2	2
Real time communications and Inter task communication.	2	2
Real time programming languages and design techniques.	2	2
Best practices in real-time computing, and real –time systems use cases.	2	2
Typical case Study	2	2

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

Assessment Weight

Assessment	Weight %
Mid Term Exam	5
Final Exam	80
Course Project	10
Course Work & Quizzes	5
Total	100

Course Work & Quizzes

Short Exams, Assignments, Research, Reports, Presentations
Class/Project discussion

List of references

Essential books (textbooks)	-Real Time Systems – Mall Rajib, Pearson Education -Real-Time Systems: Scheduling, Analysis, and Verification Albert M. K. Cheng, Wiley.
Course notes	E-Learning Portal
Recommended books	Real Time Systems – Jane W. S. Liu, Pearson Education Publication
Periodicals, website	None
Videos link	

Required Facilities

Tools & SW (Technology facilities):	-MS Project SW Package for scheduling projects -MS Power Point SW Package for presentation -MS Visio SW Package to build the Data flow diagrams -MS Access database SW Package to practice building and documenting ERD -MS Word SW Package for system documentation preparation		
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	a4	a5	b1	b2	b3	c1	c2	c3	d1	d2
Introduction to real time systems.	√												
A reference model and architecture of real time systems										√			
Scheduling commonly used approaches in real time systems: hard real time scheduling,			√			√		√					
Clock-driven scheduling,						√							
Priority-driven scheduling of periodic tasks/Jobs in Priority-driven systems,						√							
Scheduling periodic and sporadic tasks.						√							
Scheduling flexible computations and tasks with temporal distance constraints.						√							
Multiprocessor scheduling and resource access control and Synchronization.						√							
Real time operating system;		√						√					
Resources and resource				√									

access control.														
Real time communications and Inter task communication.						√								
Real time programming languages and design techniques.											√		√	
Best practices in real-time computing, and real -time systems use cases.											√			
Typical case Study	√										√			√

Learning Method /ILOs Matrix

Learning Methods	Knowledge & understanding					Intellectual skills			Professional and practical skills			General	
	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1	d2
Lectures	√	√	√	√	√	√	√	√	√	√	√		
Tutorial Exercises		√	√	√	√	√	√	√	√	√	√		
Discussions.	√	√	√	√	√	√	√	√	√	√	√	√	√

Assessment Methods /ILOs Matrix

Assessment Methods	Knowledge & understanding					Intellectual skills			Professional & practical skills			General	
	a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	c3	d1	d2
Mid Term Exam	√	√	√	√	√	√	√	√	√	√	√		
Final Exam	√	√	√	√	√	√	√	√	√	√	√		
Course Project	√	√	√	√	√	√	√	√	√	√	√	√	√
Course Work & Quizzes	√	√	√	√	√	√	√	√	√	√	√	√	√

Course ILOs Vs Program ILOs

Course ILOs \ Prog ILOs		Knowledge & understanding	Intellectual skills		Professional and practical skills		General
		A15	B9	B10	C1	C5	D2
Knowledge and Understanding	a1	√					
	a2	√					
	a3	√					
	a4	√					
	a5	√					
Intellectual skills	b1		√	√			
	b2		√	√			
	b3		√	√			
Professional and practical skills	c1				√	√	
	c2				√	√	
	c3				√	√	
General skills	d1						√
	d2						√

Course Coordinator : Dr. Magdy E. Elhennawy ()

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

Date: 22/2/2023