

Syrian Arab Republic	 الجامعة الافتراضية السورية SYRIAN VIRTUAL UNIVERSITY	الجمهورية العربية السورية
Ministry of Higher Education		وزارة التعليم العالي
Syrian Virtual University		الجامعة الافتراضية السورية

Course Definition Document

RealTime Systems

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1. Basic Information:

Course Name	RealTime Systems
Course ID	NRT601
No. of Recorded Sessions*	10
No. of Synchronized Sessions*	14
No. of Quizzes (hrs.)	0
Exam (hrs.)	1
Registered Sessions Work Load (hrs.)	48
Synchronized Sessions Work Load (hrs.)	48
Credit Hours	6

* The duration of each session 1.5 hr

2. Pre-Requisites:

Course	ID
Operating Systems (2)	NOS601
Network Services	NNS601

3. Course Objectives:

The course "RealTime Systems" is an elective course for computer science students that aspire to work in the field of industrial computing. The requirements of industrial computing systems, being for hardware, software and network components, are quite different from those of traditional systems.

4. Learning Outcomes (LO):

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Upon completion of this course, the student will acquire knowledge about RealTime concept and its various forms, along with understanding its impact on the design of all features of a computing system:

- Hardware (design and operational requirements for hardware components and buses).
- Operating Systems (Scheduling and Synchronization)
- Network and protocols
- Programming languages and related features.

5. Assessment Results:

Chapter No.	Chapter Title	Intended Objectives	Assessment Type				
			Developed content/ Recorded Sessions	Practical Activities (Synchronized Sessions)	Quizzes and Exams	Presentations And Interviews	Reports
CH1	Concept and Definitions	Understand	X	X	X		
CH2	Hardware in RT systems	Understand	X	X	X		
CH3	RTOS	Understand + apply and master tools	X	X	X		X
CH4	Network and transport protocols	Understand	X	X	X		
CH5	Programming languages	Understand + apply and master tools	X	X	X		X

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6. Course Syllabus

Chapter No.	Chapter Title	Chapter Content (Syllabus)	No. of Theoretical Learning Units	No. of Practical Learning Units)
CH1	Concept and Definitions	<ol style="list-style-type: none"> 1. Concept of "RealTime" and difference vs. "fast" 2. RT systems classification 3. RT systems general requirements 	1	0
CH2	Hardware in RT systems	<ol style="list-style-type: none"> 1. Hardware requirements for RT systems 2. Specific features for embedded processors 3. Buses and standards (e.g: CompactPCI). 	2	0
CH3	RTOS	<ol style="list-style-type: none"> 1. Reminder of OS and main features (processes, concurrency and scheduling) 2. RT scheduling algorithms 3. Process synchronization and RT requirements 4. Priority inversion problem and solutions 	4	2
CH4	Network and transport protocols	<ol style="list-style-type: none"> 1. Data communication requirements in RT systems 	1	0

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		2. Networks used in RT environment (e.g. Industrial Ethernet). 3. Multimedia requirements and RT transport requirements		
CH5	Programming languages	1. Programming languages used in RT systems development 2. Concepts of time and timing constraints and their formalization by programming languages, e.g: ADA95 3. Traditional programming languages in RT development, e.g: C, Java.	2	2

7. Practical Activity:

- Tools and Labs:

Tool Name	Description
FreeRTOS	RealTime Operating System (RTOS) simulator
GNAT	ADA programming environment

- Practical Activities per Chapters:

Chapter	Practical Activity	Remarks
CH2	<input checked="" type="checkbox"/> Exercises	
CH3	<input checked="" type="checkbox"/> Exercises	

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	<input checked="" type="checkbox"/> Homework	
CH4	<input checked="" type="checkbox"/> Exercises	
CH5	<input checked="" type="checkbox"/> Exercises <input checked="" type="checkbox"/> Homework	

8. References:

Real-Time Systems: Theory and Practice 1st Edition, by Rajib Mall, ISBN: 978-8131700693