



**University of Tehran**  
**School of Electrical and Computer Engineering**

<b>Course:</b>	<b>8101426 – Interface Circuits Design</b>									
<b>Course type:</b>	EE*						CE*			Credit: 3
	Com	E	P	B	Con	D	SW	HW	IT	
	Required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
Elective	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>Level:</b>	Undergraduate <input checked="" type="checkbox"/> Graduate <input type="checkbox"/>									
<b>Co-requisite(s):</b>	None.									
<b>Prerequisite(s):</b>	Microprocessors I (8101207)									
<b>Prerequisite by topic:</b>	Digital design concepts Microprocessors, advance programming, and assembly language									
<b>Textbook(s):</b>	[1] M. Mazidi, the AVR microcontroller and embedded systems, Prentice Hall., 2011. [2] J. Axelson, USB Complete: everything you need to develop USB peripherals, third edition, Lakeview Research Pub., 2005. [3] A set of datasheets for PCI, Bluetooth, SATA, and ARM AMBA									
<b>Coordinator:</b>	Mehdi Modarressi, Assistant Professor, School of ECE									
<b>Goals:</b>	Students are expected to acquire required skills to understand the architecture of a modern PC, tablet, and smartphone and different interface protocols that connect these devices to peripherals.									
<b>Outcome:</b>	Upon successful completion of the course, students will be able to 1. Have a good knowledge about the architecture of a x86 computer (PC) and ARM-based devices (tablets and smartphones) and common peripheral devices 2. Know the important interface circuits and protocols that connect these systems to peripherals. 3. Select the right interface based on the peripheral requirements (bandwidth, fault tolerance, cost and so forth) 4. Work with USB and design and implement USB-based peripherals									
<b>Topics:</b>	1) Architecture of PC and tablet motherboards a. Embedded systems vs. PCs vs handheld devices b. Conventional motherboard and interfaces c. Modern motherboard and interfaces d. The motherboard in an SoC-based tablet and interfaces 2) USB interface and protocol 3) I2C interface and protocol 4) SPI interface and protocol 5) PCI interface and protocol 6) PCI-express interface and protocol									

	<ul style="list-style-type: none"> <li>7) Zigbee and Bluetooth interface and protocol</li> <li>8) Interfaces for storage systems (SATA, MicroSD)</li> <li>9) On-chip interfaces <ul style="list-style-type: none"> <li>a. ARM architecture</li> <li>b. ARM AMBA interface and protocol</li> </ul> </li> </ul>										
<b>Computer usage:</b>	<ul style="list-style-type: none"> <li>1. Altium Designer tool</li> <li>2. STM ARM-based boards</li> </ul>										
<b>Assignments:</b>	<ul style="list-style-type: none"> <li>3. Altium Designer tool</li> <li>4. STM ARM-based boards</li> </ul>										
<b>Projects:</b>	One final project. The project is to connect a USB-based board to a PC. It involves designing and implementing the USB board (that uses the FT232 chip) and the required drives on the PC.										
<b>Grading:</b>	<table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;">Assignments:</td> <td>10 %</td> </tr> <tr> <td>Projects:</td> <td>15 %</td> </tr> <tr> <td>Quizzes:</td> <td>5 %</td> </tr> <tr> <td>Midterm exams:</td> <td>30%</td> </tr> <tr> <td>Final exam:</td> <td>40 %</td> </tr> </table>	Assignments:	10 %	Projects:	15 %	Quizzes:	5 %	Midterm exams:	30%	Final exam:	40 %
Assignments:	10 %										
Projects:	15 %										
Quizzes:	5 %										
Midterm exams:	30%										
Final exam:	40 %										
<b>Further readings:</b>	[1] Datasheet of ARM AMBA, PCI, PCI-express, SATA, and Bluetooth										
<b>Prepared by:</b>	Mehdi Modarressi										
<b>Date:</b>	September, 22, 2017										

*EE: Electrical Engineering		CE: Computer Engineering	
Com	Communications	SW	Software
E	Electronics	HW	Hardware
P	Power	IT	Information Technology
B	Bioelectronics		
Con	Control		
D	Digital System		