



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

<b>Course:</b>	<b>8101342 – Object Oriented Modeling of Electronic Circuits</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 type="checkbox"/>	
	Elective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Level:</b>	Undergraduate <input checked="" type="checkbox"/> Graduate <input type="checkbox"/>									
<b>Co-requisite(s):</b>	None.									
<b>Prerequisite(s):</b>	Digital Logic Design (8101367)									
<b>Prerequisite by topic:</b>										
<b>Textbook(s):</b>	<p>[1] Zainalabedin Navabi, <i>Course Materials: Video (16 hours) and Booklet</i>. University of Tehran, 2014.</p> <p>[2] SystemC manuals and SystemC Resource Page at: <a href="http://www.accellera.org">http://www.accellera.org</a>.</p> <p>[3] Paul J. Deitel and Harvey M. Deitel, <i>C++ for Programmers</i>. Prentice Hall, 2009.</p>									
<b>Coordinator:</b>	Dr. Zainalabedin Navabi , School of ECE									
<b>Goals:</b>	<p>This course discusses object oriented modeling of electronic systems and components. Advanced programming concepts with a hardware orientation will be discussed. Using C++ based SystemC language for RT level components, and its derivative SystemC-AMS for analog and mixed signal will be covered. The presented principles are based on object-oriented techniques and are described using C++ language.</p> <p>The primary goal of this course is to introduce students to the basic of principles of electronic circuit modeling by object-oriented programming. This is done by means of hardware-oriented examples. This way, both concepts of object-oriented programming and logic simulation will be learned together.</p>									
<b>Outcome:</b>	<p>Upon successful completion of the course, students will be able</p> <ol style="list-style-type: none"> <li>1. Model Logic Elements in C++</li> <li>2. Use C++ as a programming for simple algorithm and applications</li> <li>3. To understand object oriented concepts like inheritance and using them for modeling digital components</li> <li>4. Model RT level component in C++</li> <li>5. Use SystemC for describing RT level circuits</li> <li>6. Simulation using SystemC library in Visual Studio</li> <li>7. Use SystemC-AMS for describing electronic circuits and components</li> </ol>									

	8. Generate a mixed model consisting of digital and analog parts using SystemC and SystemC-AMS 9. Simulation of mixed models using SystemC library and Visula Studio
<b>Topics:</b>	1) The practical use of object-oriented concepts to model electronic parts; 2) Using object oriented modeling techniques for modeling complete integrated electronic systems and their interfaces; 3) An introduction to understand the modeling and simulation of logic circuits; 4) Implementation of object-oriented logic simulation models; 5) Modeling and simulation of RTL design using C++ sequential programming language; 6) RT level SystemC hardware description language; 7) Implementation of object-oriented analog devices simulation models; 8) SystemC-AMS as a language for analog/mixed signal modeling; 9) Learning techniques for testing and validation of both software and logic simulation programs;
<b>Computer usage:</b>	Microsoft Visual Studio 2010 or 2013 and SystemC from Accellera.com
<b>Assignments:</b>	.... to .... homework assignments
<b>Projects:</b>	
<b>Grading:</b>	Assignments: 15 % Projects: 20 % Quizzes: 10 % Midterm exams: 20% Final exam: 35 %
<b>Further readings:</b>	[1] Jayantha Katupitiya and Kim Bentley, <i>Interfacing with C++: Programming Real-World Applications</i> . Springer, 2006. [2] Bruce Eckel, <i>Thinking in C++</i> . Volume 1, 2, Prentice Hall, 2000, 2003. [3] S. Sallah and A. Zomaya, <i>Compuing for Numerial Methods Using Visual C++</i> , John Wiley, 2007.
<b>Prepared by:</b>	Dr. Zainalabedin Navabi
<b>Date:</b>	1396/09/26

*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		