



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

<b>Course:</b>	<b>Information Hiding</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 checked="" 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 type="checkbox"/> Graduate <input checked="" type="checkbox"/>									
<b>Co-requisite(s):</b>										
<b>Prerequisite(s):</b>	Digital Signal Processing, Probability and Statistics, Digital Communications.									
<b>Prerequisite by topic:</b>	Having background in digital signals and systems, filtering, and probability and stochastic . Familiar with digital communication.									
<b>Textbook(s):</b>	<p>[1] M. Barni, F. Bartolinim, <i>Watermarking System Engineering</i>, 2<sup>nd</sup> Edition, Marcel Dekker Inc., Newyork, 2004.</p> <p>[2] J. Fridrich, <i>Steganography in Digital Media: Principles, Algorithms, and Applications</i>, 1<sup>st</sup> Edition, Cambridge Univ. Press, 2010.</p> <p>[3] I. Cox, M. Miller, J. Bloom, J. Fridrich, T. Kalker, <i>Digital Watermarking and Steganography</i>, 2nd Edition, Morgan Kaufmann, MA, 2009.</p>									
<b>Coordinator:</b>	Mohammad Ali Akhaee, Assistant Professor									
<b>Goals:</b>	<p>This course provides an introduction to data hiding with a focus on speech and image processing. The two major issues we will deal with are: (1) digital watermarking, and (2) steganography.</p> <p>Digital watermarking addresses problems of robustness and side effects of the watermarking. And we will touch the flavor of different security issues of data hiding in steganography. The preliminary schemes in both cases will be introduced and their strengths and weaknesses are addressed.</p>									
<b>Outcome:</b>	<p>Upon successful completion of the course, students will be able</p> <ol style="list-style-type: none"> <li>1. To get a basic understanding of the principle problems faced by <i>data hiding</i> technologies</li> <li>2. To be able to implement simple <i>information hiding</i> methods and test their performance</li> <li>3. To become familiar with steganalysis techniques as a way to detect <i>data hiding</i> systems</li> </ol>									
<b>Topics:</b>	<p><b>An introduction to Steganography and Watermarking systems</b></p> <p>History Definition, requirement, properties, and application of data hiding systems Classification Design and implementation principals</p>									

	<p><b>Overview on Detection Theory, Speech, Image, and Video Processing</b></p> <p><b>Preliminary Data Hiding schemes</b></p> <p>Least Significant bit (LSB)  Quantization Index Modulation (QIM)  Spread spectrum (SS)  Patchwork  Scaling Based  Echo Hiding  Based on phase Modulation  Innovative</p> <p><b>Watermark Impairments and Benchmarking</b></p> <p>Classification of attacks  Measuring obtrusiveness and attack strength</p> <p><b>Information Hiding Security</b></p> <p>Security based on Information Theory  Perfect security  Security based on minimum distortion</p> <p><b>Steganalysis</b></p> <p>Generic Block Diagram  Statistical steganalysis  Target based scheme  Blind steganalysis</p>								
<b>Computer usage:</b>	Some parts of the course will be presented using PowerPoint.								
<b>Assignments:</b>	Three written assignments, five computer assignments, Presenting a research paper of data hiding field								
<b>Projects:</b>	Students will choose a project topic from the beginning of the semester. The project consists of the design and implementation of a novel data hiding scheme along with its performance evaluation.								
<b>Grading:</b>	<table> <tr> <td>Assignments</td> <td>10%</td> </tr> <tr> <td>Final Project</td> <td>30%</td> </tr> <tr> <td>Midterm exam:</td> <td>25%</td> </tr> <tr> <td>Final exam:</td> <td>35%</td> </tr> </table>	Assignments	10%	Final Project	30%	Midterm exam:	25%	Final exam:	35%
Assignments	10%								
Final Project	30%								
Midterm exam:	25%								
Final exam:	35%								
<b>Further readings:</b>	[1] Digital Watermarking World <a href="http://www.watermarkingworld.org/">http://www.watermarkingworld.org/</a> [2] Stirmark Benchmark, <a href="http://fabien/watermarking/stirmark/">http://fabien/watermarking/stirmark/</a>								
<b>Prepared by:</b>	Mohammad Ali Akhaee								
<b>Date:</b>	Aug, 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		