University of Tehran
School of Electrical and Computer Engineering

Course:	**8101990 - Multimedia Communications Laboratory**		
Course type:	Required (Replicable with Communications Circuits Lab)	EE*	Credit: 1
Level:	Undergraduate		
Co-requisite(s):	Wireless Multimedia Communications (8101670)		
Prerequisite(s):	None		
Prerequisite by topic:	Quantization, Differential Source Coding, Transform Coding, Linear Block Codes, Convolutional Codes, Viterbi Decoding, C Programming Language		
Textbook(s):	B. Asadi, F. Lahouti, *Multimedia Communications Lab Manual*, School of Electrical & Computer Engineering, University of Tehran, 2010.		
Coordinator:	Farshad Lahouti, Associate Professor, School of ECE		
Goals:	In this lab, the design and implementation principles of source and channel coding algorithms for multimedia communications are explored. The students will learn how to evaluate the performance of these algorithms using MATLAB. Also, this lab provides students with hands-on experience in the implementation of coding algorithms for multimedia communications on TI DSPs.		
Outcome:	Upon successful completion of the course, students will be able to 1. design and implement quantization algorithms 2. implement standard differential source coders for speech 3. implement compression algorithms based on transform coding for images 4. evaluate the performance of linear block codes over AWGN and fading channels 5. implement binary cyclic codes 6. implement Viterbi algorithm for different applications 7. evaluate the performance of the convolutional codes using Viterbi decoder 8. program TI DSPs		
Topics:	**Experiment 1:** Getting Started with Hardware and Software Platforms **Experiment 2:** Sampling of Analog Signals **Experiment 3:** Design and Implementation of Uniform Quantization		

	Algorithms **Experiment 4:** Non-uniform and Adaptive Quantization Algorithms **Experiment 5:** Differential and Adaptive Differential Source Coders **Experiment 6:** Real-Time Implementation of Adaptive Differential Source Coders for Speech Signals (Bluetooth Audio Codec and G.726) **Experiment 7:** Image Compression Using Transform Coding **Experiment 8:** Design and Implementation of Linear Block Codes **Experiment 9:** Design and Implementation of Cyclic Codes **Experiment 10:** Convolutional Codes and Viterbi Decoding: Design and Performance Evaluation
Computer usage:	MATLAB, C Programming
Assignments:	Pre-labs and lab reports
Projects:	One final project (case by case basis as applicable)
Grading:	Pre-labs, Lab activity and Participation: 35% Lab reports, Exam, Project: 65%
Further readings:	[1] K. Sayood, *Introduction to Data Compression*. Morgan Kaufmann, 2005. [2] A. Gersho and R. M. Gray, *Vector Quantization and Signal Compression*, Springer, 1991. [3] S. Lin and D. J. Costello, *Error Control Coding*. Prentice Hall, 2004. [4] T. K. Moon, *Error Correction Coding: Mathematical Methods and Algorithms*, Wiley, 2005.
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*EE: Electrical Engineering CE: Computer Engineering IT: Information Technology