University/Academy: Arab Academy for Science and Technology & Maritime Transport
Faculty/Institute: College of Computing and Information Technology
Program: Computer Science

Form No. (12)
Course Specification

1- Course Data

Course Code:	Course Title:	Academic Year/Level:
CS454	Multimedia Acquisition and Communication	Year 4 / Semester 8
Specialization: Computer Science	**No. of Instructional Units:** 2 hrs lecture 2 hrs lab	**Lecture:**

2- Course Aim	Standards of multimedia information systems and multimedia networks. Multimedia networks, transport protocols, multicast, and resource management. Audio compression standards, and still images and video compression standards (JPEG, MPEG-1 and MPEG-2). Video conferencing standards, video servers, and digital libraries. Multimedia real-time processing, multimedia enhanced computer systems.
3- Intended Learning Outcome:	
a- Knowledge and Understanding	**Students will be able to demonstrate knowledge of:** **K16.** Know and understand the principles and techniques of a number of application areas informed by the research directions of the subject, such as artificial intelligence, natural language processing, data mining, databases and computer graphics. **K17.** Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition. • Know the elements of multimedia systems (K16,K17) • Define basic terminology and concepts of multimedia(K16,K17) • Describe the multimedia applications(K16,K17) • Explain text representations in multimedia data(K16,K17) • Explain procedures of image capture and image display. (K16,K17) • Define resolution and quantisation. (K16,K17) • Know about colour and colour spaces, storage of images in memory, and display devices(K16,K17) • Know video coding and video content acquisition. (K16,K17) • Clarify the effects of digitization on video content. (K16,K17) • Know audio coding and audio content acquisition. (K16,K17) • Know about quantizer, quantization error, and quantization

	noise. (K16,K17) • Explain sound compression, transmission, and authoring. (K16,K17) • Explain in depth various Audio formats. (K16,K17) • Know about transparency, compression ratio, transcoding and editing(K16,K17) • Explain downsampling and compressed representation scalability • Investigate different Lossy Compression algorithms(K16,K17) • Explain color profile and syntax and structure of JPEG Image compression standard. (K16,K17) • Know the basics of Computer and Multimedia Networks. (K16,K17) • Expalin access networks and physical media. (K16,K17) • Explain application, transport & Network Layers. (K16,K17) • Know the basics of Multimedia Network Applications(K16,K17) • Explain in details different Protocols and Architectures(K16,K17)
b- Intellectual Skills	**By the end of the course, the student acquires high skills and an ability to understand:** **I18.** Solve computer science problems with pressing commercial or industrial constraints. **I19.** Generate an innovative design to solve a problem containing a range of commercial and industrial constraints. • Identify text attributes • Interpret basic design principles • Compare theoretically between the different color spaces. • Compare current computer vision capabilities against human vision. • Compare between different digital audio formats • Compare between mid-riser and mid-tread • Analyse the stochastic process involved in quantization • Differentiate between different lossless algorithms with respect to aforementioned criteria. • Analyse the efficacy of lossy and lossless compression. • Identify the network structure. • Analyse different Internet protocol stacks. • Identify the application architectures. • Analyse Web and HTTP, Network layer connection, connection-less service and Transport Layer — TCP and UDP. • Identify the classes of MM applications: stored streaming, live streaming and interactive (real-time) • Identify various protocols for real-time interactive applications RTP,RTCP,SIP • Analyse QoS guarantees

c- Professional Skills	**By the end of the course the student will have the ability to:** **P16.** Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video. Evaluate different multimedia tools • Practice implementation skills for data representation in poster

	analysis • Evaluate the suitability of various image representations for different applications • Carry out an experiment on analog vs digital Video • Evaluate the current emerging technologies • Carry out an experiment on the digitization of sound. • Evaluate Signal to Noise Ratio (SNR) • Practice digital audio to analog Conversion • Practice the use of Musical Instrument Digital Interface (MIDI). • Gain hands-on experience in: Run-Length Coding, Variable-Length Coding (VLC), Dictionary-based Coding, and Arithmetic Coding. • Evaluate distortion Measures, the Rate-Distortion Theory, Quantization, Transform Coding and Discrete Cosine Transform and Wavelet-Based Coding • Evaluate the factors that affect the performance of multimedia systems components and technologies. • Evaluate the technologies and the factors that affect their performance. • Gain hands-on experience in streaming stored audio and video and interactive Multimedia Applications • Practice specific and mechanisms for QoS architectures.
d- General Skills	**Students will be able to:** **G1.** Demonstrate the ability to make use of a range of learning resources and to manage one's own learning. **G2.** Demonstrate skills in group working, team management, time management and organizational skills. **G7.** Show the use of general computing facilities. • The course gives an overview of the Multimedia Acquisition and Communications and some issues in the field. • The course provides a clear view in how to create some simple Programming Projects using MATLAB software
4- Course Content	1 | Outline, classify and compare the basics of Image, Video and Audio multimedia systems and different formats and representations 2 | Analyse, criticize, evaluate and implement the basic Huffman coding (Entropy coding) 3 | Analyse, criticize, evaluate and implement the Jpeg image compression standard 4 | Analyse, criticize, evaluate and implement the Mpeg video compression standard 5 | Analyse, criticize, evaluate and implement the Mp3 audio compression standard 6 | Outline the basic concepts of multimedia networking and security
5- Teaching and Learning Methods	Lectures, Labs, Projects, Individual study & self-learning.

6- Teaching and Learning Methods for Students with Special Needs	• Students with special needs are requested to contact the college representative for special needs (currently Dr Hoda Mamdouh in room C504) • Consulting with lecturer during office hours. • Consulting with teaching assistant during office hours. • Private Sessions for redelivering the lecture contents. • For handicapped accessibility, please refer to program specification.
7- Student Assessment:	
a- Procedures used:	Exams and Individual Projects
b- Schedule:	Week 7 exam 2 Projects through the semester Week 16Final exam
c- Weighing of Assessment:	7^{th} week exam 30% Project 1 10% Project 2 10% Lab work 10% Final exam 40%
8- List of References:	
a- Course Notes	From the Moodle on www.aast.edu
b- Required Books (Textbooks)	"Video Coding for Wireless Communication Systems", Marcel Dekker, "K.N. Ngan, C.W. Yap, K.T. Tan, 2001.
c- Recommended Books	Fundamentals of Multimedia, Drew, Nian, Prentice Hall, 2004
d- Periodicals, Web Sites, ..., etc.	

Course Instructor: **Head of Department:**

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