The University of Jordan
School of Engineering
Electrical Engineering Department
2nd Semester – A.Y. 2023/2024

Course: **Multimedia Transmission – 0953521 (3 Cr. – Elective Course)**

Instructor: Prof. Mohammed Hawa

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Office Hours: Will be posted soon

Platform: http://www.hawa.work/521 and Moodle (https://elearning.ju.edu.jo/)

Catalog description: Introduction to information theory and source coding. Huffman coding and decoding. Voice encoding schemes and standards: PCM, CELP, Vocoding, etc. Voice-over-IP (VoIP). Voice quality and traffic characterization. Image and video encoding schemes and standards. MPEG compression. Video quality and traffic characterization. Analog and digital TV broadcasting systems. Video streaming over the Internet and Quality-ofService (QoS) requirements. IP unicast and multicast routing protocols. Internet QoS frameworks: Integrated Services (IntServ) and Differentiated Services (DiffServ). RealTime Transport Protocol (RTP). Real Time Streaming Protocol (RTSP). Session Initiation Protocol (SIP). Secure access to information, privacy issues, digital rights and watermarking.

Prerequisites by course: **EE 0953422** Communications (II) (pre-requisite)

Prerequisites by topic: Students are assumed to have a background in the following topics:

- Signal representation and analysis techniques.
- Linear Algebra and basic mathematical skills.
- Basics of computer hardware and software.

Textbook: **Image and Video Compression for Multimedia Engineering: Fundamentals, Algorithms, and Standards by Yun-Qing Shi and Huifang Sun, CRC Press, 3rd Edition, 2021.**

1. Implementing Cisco IP Telephony and Video, Part 2 (CIPTV2) Foundation Learning Guide (CCNP Collaboration Exam 300-075 CIPTV2) by William Alexander Hannah and Akhil Behl, Cisco Press, 3rd Edition, 2016.
2. Signal Computing: Digital Signals in the Software Domain by Michael Stiber, Bilin Zhang Stiber, and Eric C. Larson, Online, 2020, (http://faculty.washington.edu/stiber/pubs/Signal-Computing/).
3. Data Communications and Networking with TCP/IP Protocol Suite by Behrouz A. Forouzan, McGraw Hill, 6th edition, 2022.
4. Computer Networking: A Top-Down Approach by James F. Kurose and Keith W.

References:

Ross, Pearson, 8th edition, 2022.
5. Computer Networks: A Systems Approach by Larry L. Peterson and Bruce S. Davie, Morgan Kaufmann, 6th edition, 2021.
6. Modern Digital and Analog Communications Systems by B. P. Lathi and Zhi Ding, Oxford University Press, 5th Edition, 2018.
7. Digital Communications: Fundamentals and Applications by Bernard Sklar, Prentice Hall, 2nd Edition, 2017.

On Campus [16 Weeks, 42 lectures (50 minutes each) including exams]

of the most popular image, video and audio compression algorithms, along with streaming approaches for such data types on modem communication infrastructure, including wireless systems. Quality-of-Service (QoS) requirements and issues are also emphasized.

Schedule:

Course goals:

Course learning outcomes (CLO) and relation to ABET student outcomes (SO):

Upon successful completion of this course, a student will:	[SO]
1. Become familiar with the main multimedia data types including images, audio, and video, and their characteristics.	[1]
2. Understand some of the popular image, video and audio compression algorithms.	
3. Identify the issues involved in the different audio and video streaming approaches.	[1]
4. Learn the main standards and protocols within the context of multimedia transmission, such as RTP, RTCP, RTSP, MPEG, AV1, VoIP, SIP, H.323, etc.	[1]
5. Be able to identify different quality of service models.	[1]

Course topics:

	Hrs
1. Introduction to information theory, redundance and source coding.	3
2. Huffman coding and decoding.	3
3. Image and video compression. MPEG compression. Video quality and traffic characterization.	6
4. Analog and digital TV broadcasting systems. Video streaming over the Internet and Quality-ofService (QoS) requirements.	5
5. IP unicast and multicast routing protocols. Internet QoS frameworks: Integrated Services (IntServ) and Differentiated Services (DiffServ).	5
6. Real-Time Transport Protocol (RTP). Real Time Streaming Protocol (RTSP), and Real-Time Transport Control Protocol (RTCP).	3
7. Voice encoding schemes and standards: PCM, CELP, Vocoding, etc.	6
8. Voice-over-IP (VoIP). Voice quality and traffic characterization.	4
9. Session Initiation Protocol (SIP) and H323.	3
10. Secure access to information, privacy issues, digital rights and watermarking.	2

Ground rules: Attendance is required and highly encouraged. To that end, attendance will be taken every lecture. Eating and drinking are not allowed during class, and cell phones must be set to silent mode. All exams (including the final exam) should be considered cumulative. Exams are closed book. No scratch paper is allowed. You will be held responsible for all reading material assigned, even if it is not explicitly covered in lecture notes. Academic integrity must be maintained.

Assessment & grading policy:

First Exam	20%	Assignments	0%
Midterm Exam	30%	Projects	0%
Final Exam	50%	Lab Reports	0%
Quizzes	0%	Presentation	0%
		Total	**100%**

Last Revised: Feb 2024