Democratic and Popular Republic of Algeria

Ministry of Higher Education and Scientific Research.

University of Mohamed Boudiaf Msila.

Faculty of Mathematics and Computer Science

Departement of Computer Science

Lesson Plan:
QoS and MultiMedia

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1. General Infromation:

- University: Mohamed Boudiaf University, Msila, Algeria.
- Faculty: Mathematics and Computer Science.
- Department: Computer Science.
- Target Group: First year of master Students.
- Specialty: RTIC
- Subject: Algebra 1
- Coefficient: 3
- Credit: 5
- Lecture ,Tutorial class and Practical work
- Volume Horiare: 4 and half hours per week/ 64 hours per semester.
- Teacher's name: Dr. Ahmed GHENABZIA
  Email: ahmed.ghenabzia@univ-msila.dz

2. Presentation of the Lesson

Quality of Service and Multimedia aims to provide students with a theoretical and technical understanding of multimedia components and systems. It covers contemporary, interactive multimedia technology systems, focusing on types, applications, and theories of operation. Additionally, it includes multimedia data representation, compression, retrieval, and communication in an integrated manner. Upon completing the course, students will understand the fundamental concepts and be able to critique the technologies associated with various QoS rules in network multimedia communication.

3. Content of the Lesson

The course is structured into weekly modules, each focusing on a specific topic. The content is as follows: (See figure 1).

1- Introduction to Multimedia Systems
   a. Multimedia and multimedia systems
   b. Exploring multimedia usage and types
2- Digital Image Fundamentals
   a. Gray scale image, color image structure
   b. Lookup table color image
   c. Image extensions
3- Digital Image Processing
   a. Histogram and histogram normalization
   b. Fourier Transform
   c. Convolution
4- Digital Audio Fundamentals
   a. Waveform, audio structure
   b. Audio features, sample rate, bit depth
   c. Audio extensions
5- Lossless Compression
   a. Data entropy

b. Shannon-Fano algorithm
c. Huffman algorithm

6- Lossy Compression
   a. Discrete Cosine Transform (DCT)
   b. Inverse DCT

7- DCT Applications
   a. JPEG
   b. MPEG4

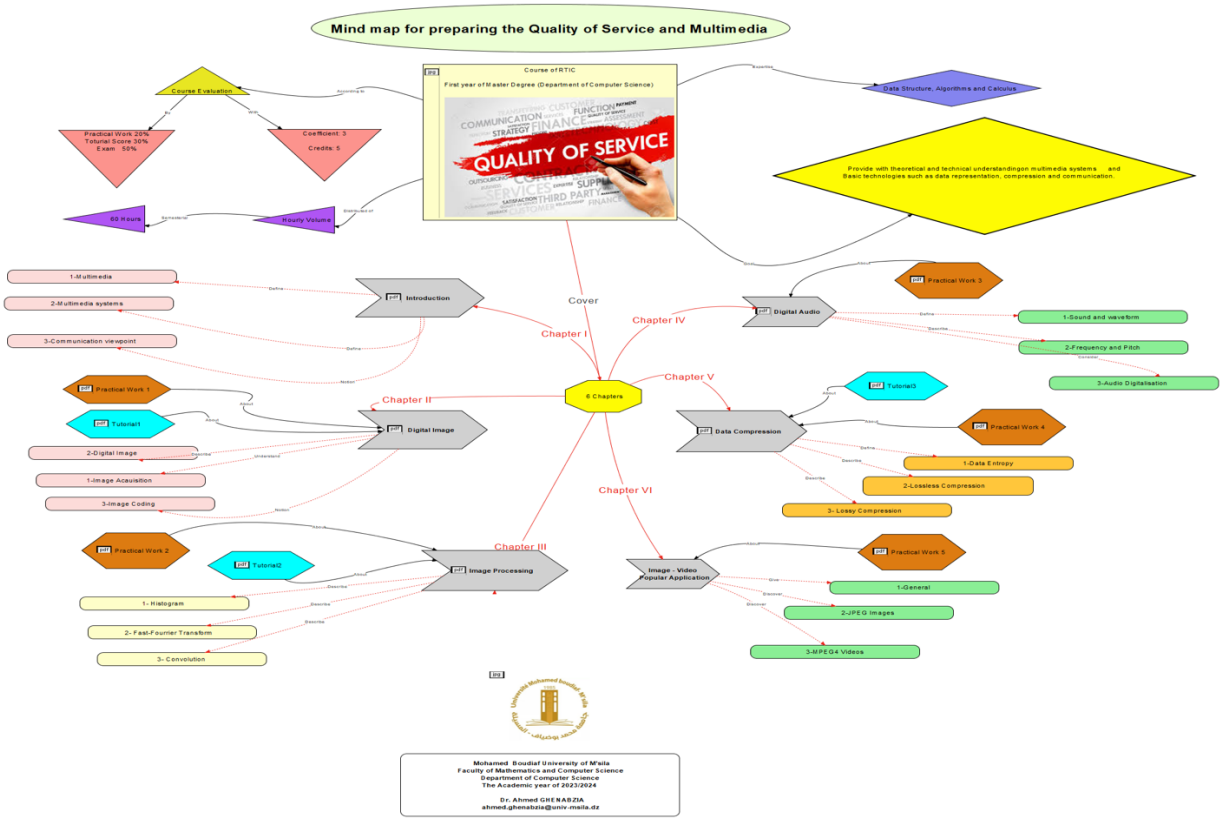


Figure 1 : Mind mapping which explain the content of each chapter of this course (QoS) in details. For more details of this course is available on line or in the platform

4. Prerequisites :

To understand the most of this course, students should know the following achievements:

- Strong foundation in data structures and networking.
- Basic knowledge of calculus, probability, and programming.

To test these three prerequisites, a test is made available to you on the distance learning platform

The aim of this test is to check your prerequisites on Multimedia. The test is available starting from the first week and the duration time is 20 minutes, you have only one try. If the score is less then 60% , that means you are recommended to read the following books (click here to download *chapter 12.3….pdf (cf. chapter 1,2,3,..)*, . i.e, These books are recommended for those who did failed the quizzes of Prerequisites.

5. Learning Objectives

The purpose of this course is to provide students with a comprehensive understanding of the fundamental concepts and practical applications within the field. Therefore the aim of this lesson is to:

- Understand theoretical and technical aspects of multimedia components and systems.
- Be proficient in working with different types of multimedia using Python.
- Apply compression, retrieval, and communication techniques in multimedia systems.
- Demonstrate critical thinking and problem-solving skills in real-world applications.

6. The Evaluation (The assessment methods of learning):

Final Exam :

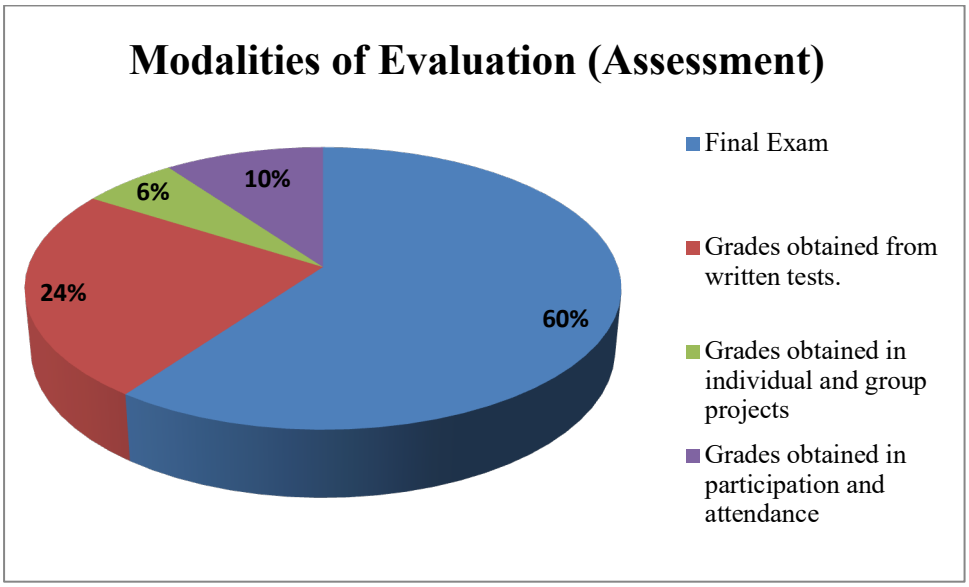
- **Date and location:** To be determined.
- **Work mode:**Individual.
- **Weighting:** 60%
- **Evaluation guidelines:** The exam, conducted under supervision, is comprehensive and consists of both practical and theoretical components. The exam is individual and without the aid of any documents (lecture notes, lab instructions or solutions, books, articles, handouts, etc.), except for a double-sided A4 sheet. No electronic devices (smartphones, laptops, PDAs, etc.) are permitted during the exam. Any copies, notes, or additional documents that may be requested during the exam must be submitted by the students at the end of the exam.

Continuous and regular assessment (Tutorial Series TD):

With the remaining 40%, allowing you to accumulate points throughout the semester, this continuous assessment is conducted through various forms:

- Grades obtained from written tests.

- Grades obtained in individual and group projects from practical works.
- Grades obtained in participation and attendance.



The final grade required to pass this course must be greater than or equal to10

7. Teaching-learningactivities :

This course is offered through two methods:

- In-person (face to face).
- Partially remote (theory remotely, practices in-person).

1. In-person (face to face):

- The course is delivered through a lecture.
- During the course, everyone is invited to participate in debates, which are generally initiated by questions, aiming to foster exchanges of ideas among students.
- Individual and group projects are also proposed to work on integrated water resources management, offered to complement and deepen the knowledge acquired during the lecture.

2. Partially remote:

- The course is offered partially remotely (theory remotely, practical sessions in person) available on the platform (Moodle: Elearning University of Msila).

- When students have course-related questions, they either post their messages on the platform forums (Moodle: Elearning University of Msila), or they directly contact the course instructor via email (ahmed.ghenabzia@univ-msila.dz).
- To ensure proper organization of the course material, students are encouraged to take quizzes offered in various formats such as multiple choice questions (MCQs), multiple select questions (MSQs), etc.

8. Apedagogical approach (Pedagogicalalignment) :

In teaching Quality of Service (QoS) and Multimedia, a pedagogical approach that aligns theoretical knowledge with practical applications is essential for fostering deep understanding and skill development. The approach involves a blend of lectures, hands-on labs, interactive discussions, and real-world problem-solving exercises to ensure students grasp both the fundamentals and their applications.

Theoretical Aspect:

1- Foundational Concepts:
   a. Lectures: Provide detailed explanations of key concepts such as multimedia data representation, compression algorithms (lossless and lossy), and QoS parameters (latency, jitter, bandwidth).
   b. Visual Aids: Use diagrams, charts, and multimedia presentations to illustrate complex theories and systems.
2- Multimedia Systems and Standards:
   a. Textbook Readings: Assign chapters from core textbooks like "Fundamentals of Multimedia" by Ze-Nian Li and S. Drew to solidify understanding of standards and practices.
   b. Interactive Sessions: Conduct discussions on contemporary multimedia systems and their applications, encouraging students to explore current trends and technologies.
3- Analytical Techniques:
   a. Problem Sets: Provide exercises on topics such as entropy calculation, Huffman coding, and DCT to reinforce learning through practice.
   b. Case Studies: Analyze real-world case studies to demonstrate the application of QoS in multimedia communications, helping students relate theory to practice.

Practical Aspect:

1- Hands-on Labs:
   a. Software Tools: Use tools like MATLAB and Python with libraries such as NumPy and OpenCV for practical labs. Labs should cover tasks like image and audio processing, implementing compression algorithms, and QoS evaluation.
   b. Step-by-Step Guides: Provide lab manuals with clear, step-by-step instructions to help students navigate through practical tasks.
2- Projects:
   a. Individual Projects: Assign projects where students implement multimedia systems, such as creating a JPEG compressor or setting up a multimedia streaming service with QoS considerations.
   b. Group Projects: Encourage collaboration on complex tasks like developing a multimedia communication system that adheres to specific QoS requirements, promoting teamwork and problem-solving skills.
3- Assessment and Feedback:

a. Continuous Assessment: Use quizzes, weekly assignments, and in-lab exercises to provide continuous feedback. This helps track student progress and identify areas needing improvement.
b. Peer Review: Incorporate peer review sessions where students present their projects and provide feedback to each other, fostering a collaborative learning environment.

4- Real-World Applications:
   a. Industry Insights: Invite industry experts to give guest lectures on the application of QoS in multimedia systems, offering students a perspective on how their learning applies in real-world scenarios.
   b. Simulation Projects: Use simulation tools to model and analyze the performance of multimedia systems under different network conditions, helping students understand the impact of QoS in practical settings.

Interactive Learning:

1- Discussion Forums:
   a. Online Platforms: Utilize online forums (e.g., Moodle) for students to post questions and engage in discussions about course content, fostering a collaborative learning community.
   b. In-Class Debates: Organize debates on controversial or emerging topics in multimedia and QoS to encourage critical thinking and active participation.
2- Workshops and Seminars:
   a. Interactive Workshops: Conduct workshops where students can work on mini-projects in teams, applying theoretical knowledge to practical tasks.
   b. Seminars: Hold seminars where students present their research on advanced topics in multimedia systems and QoS, promoting research skills and deeper understanding.
3- Feedback Mechanisms:
   a. Regular Feedback: Provide timely and constructive feedback on assignments and projects to guide students' learning processes.
   b. Surveys and Polls: Use surveys to gather student feedback on the teaching methods and course content, enabling continuous improvement of the course structure.

By integrating these pedagogical approaches, the course on Quality of Service and Multimedia will ensure that students not only understand the theoretical underpinnings of multimedia systems but also develop the practical skills necessary to apply this knowledge effectively in real-world scenarios.

9. Support resources (Help resources) :

Here are some useful and recommended resources for students in the field of QoS and Multimedia.

Books:

1. Fundamentals of Multimedia, Ze-Nian Li and S. Drew, Pearson Education, 2004.
2. Digital Multimedia, Nigel Chapman and Jenny Chapman, Wiley, 2000.
3. Multimedia Systems: Algorithms, Standards, and Industry Practices, Parag Havaldar and Gérard Medioni, Course Technology, 2010.

Web :

1. https://www.youtube.com/watch?v=RR6Ben6qVnE
2. https://www.youtube.com/watch?v=EvljboOXSQY