



UNIVERSITÀ DEGLI STUDI
DI MODENA E REGGIO EMILIA

Lecture notes for Multimedia Data Processing

Introduction

Last updated on 27/02/2023

Lecturers

- **Prof. Costantino Grana**

Student reception: Monday, 15.00-17.00 (ask for an appointment)

Email: costantino.grana@unimore.it

- **Dott. Federico Bolelli (few labs)**

Student reception: Monday, 15.00-17.00 (ask for an appointment)

Email: federico.bolelli@unimore.it

Teaching goals and prerequisites

- Aim of the course is to provide an advanced understanding of tools, algorithms and formats used in the acquisition, management and processing of multimedia data.
- The programming language used during the course will be C++.
- To successfully follow this course **it is essential to know how to program with C language.**
- In particular during the exam you will be asked to demonstrate your understanding of the course topics, writing compression/decompression routines using the algorithms illustrated in the course with C++.

Course program

- Data compression
 - Color and its representation
 - JPEG compression
 - Video compression
 - Acquisition of images
 - Audio acquisition
 - Audio compression
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- Programming: from C to C++; the recent C++ language and its standard library

Lessons

- The course lectures will be
 - on Monday from 11.00 to 13.00
 - on Thursday from 8.00 to 10.00
 - on Friday from 14.00 to 16.00
- We start at the time indicated above.
- There will be no lessons on the following days:
 - From April 6th to April 14th (Easter Holydays + Exams pause)
 - April 24th (Liberation Day)
 - May 1st (Labor Day)
 - June 2nd (Republic Day)
- **The programming lessons are an integral part of the course** and important to fully understand the various topics proposed.
- It is essential to program in C++ at home!

Exam

- The exam consists of two parts:
 - 1 hour quiz test with questions on theory and small exercises on all the topics covered in the course
 - 4 hour programming test on C++ implementation of multimedia data problems
- These are evaluated, if sufficient, with a score from 18 to 33.
- The theory test must be passed with a mark of at least 18 to enter the programming test.
- The calendar and registration for the tests will be found on ESSE3.
- Once the tests are passed, the final mark is calculated as the weighted average between theory (weight = 1) and programming (weight = 2). This mark will be valid until February 2024.
- If the final mark is 31 or more you will get «30 e lode».

Exam

- The theory test will have 20 multiple choice questions with 4 possible answers. Exactly one is correct and three are wrong. Each correct answer gives 1.65 points, each wrong answer gives -0.55 points, a missing answer gives 0 points.
- The final mark is rounded to the nearest integer, 0.5 is rounded up.
- This mark will be valid until February 2024. So those who pass the theory test at the first try will be able to do the programming test many times.
- **Do the exam as soon as possible: don't wait for the last chance.**
- The exams (written + laboratory) will be 6: June, July (2), September, January, February. No exam on April, no exam on November. Do not ask for additional ones.
- Examples of past assignments and old laboratory tests are available on the course website: olj.ing.unimore.it

Teaching materials

- The course includes topics that are covered in different textbooks. In particular, the reference text for the representation of information and data compression is:
 - David Salomon, A Concise Introduction to Data Compression, Springer, 2008, ISBN: 978-1-84800-071-1
- The course lecture notes are also available, on which it is possible to follow what is presented in class.
- There may be some topics covered in class, but not present on the lecture notes.

Teaching materials

- For C++ programming, there are countless texts on the subject, as well as a free texts on the Internet.
- A nice text is
 - Bjarne Stroustrup, Programming: Principles and Practice Using C++, Addison-Wesley Professional, 2014, ISBN: 978-0321992789
- The fundamental aspect of programming, however, is practice!
- All examples and exercises will be done by the lecturers on Microsoft Visual Studio.
- You can use the IDE you prefer, but we will not be able to assist you in configuring or teaching how to use other tools.
- So, we suggest that you use Microsoft Visual Studio (which is free to obtain thanks to your student status)
- The course website is on Moodle: `moodle.unimore.it`