

COSI "Introduction to scientific programming"

Course level: Master

Course instructor: Philippe Colantoni (UJM)

Education period: 1st semester

Language of instruction: English

Expected prior-knowledge: C programming language

Aim:

The course fully covers the basics of programming in the "C++" programming language and presents the fundamental notions and techniques used in object-oriented programming. It starts with universal basics, not relying on object concepts and gradually extends to advanced issues observed in the objective approach.

An application of the C++ language with the OpenCV development library.

The realization of a complete development project in C++ with OpenCV.

Course outline

1. Introduction to compiling and software development
2. Basic scalar data types, operators, flow control, streamed input/output, conversions
3. Declaring, defining and invoking functions
4. Dealing with classes and objects
5. Defining overloaded operators
6. Introduction to OpenCV
7. Project management

Practical activities

- Practical works (laboratory sessions and industrial study cases based on OpenCV) in order to implement concepts introduced in the lectures, to practice on real image processing applications and to train students.
- Project with OpenCV based on a concrete case.

Learning Outcomes

- To familiarize the trainee with the universal concepts of computer programming.
- To present the syntax and semantics of the "C++" language as well as basic data types offered by the language
- To discuss the principles of the object-oriented model and its implementation in the "C++" language.
- To demonstrate the means useful in resolving typical implementation problems with the help of standard "C++" language libraries.
- To present OpenCV (a computer vision library) a widely used C++ library.

Assessment criterion:

- Written exam and Practical works (project)

Excellent - outstanding performance	A
Very Good - above the average standard but with some errors	B
Good - generally sound work with a number of notable errors	C

Satisfactory - fair but with significant shortcomings	D
Sufficient - performance meets the minimum criteria	E
Fail - some more work required before the credit can be awarded	FX
Fail - considerable further work is required	F

Literature and study materials:

- The C++ Programming Language (4th Edition), Addison-Wesley ISBN 978-0321563842. May 2013.
- The OpenCV Tutorials, http://docs.opencv.org/opencv_tutorials.pdf