



COURSE MODULE . INTRODUCTION TO SCIENTIFIC PROGRAMMING

COURSE CODE	COSI ISP
COURSE LEVEL	Master
ECTS CREDITS	5
COURSE INSTRUCTOR/S	Philippe Colantoni (UJM)
EDUCATION PERIOD	SEMESTER 1
EXPECTED PRIOR-KNOWLEDGE	Basic knowledge of C programming language
LANGUAGE OF INSTRUCTION	English

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. Two C++ libraries (QT and OpenCV) will be presented as examples.

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 STL
	7	Introduction to OpenCV
	8	Introduction to Qt

PRACTICAL ACTIVITIES ~ Practical works (laboratory sessions and industrial study cases based on OpenCV and Qt) in order to implement concepts introduced in the lectures, to practice on real applications and to train students.
~ Project based on OpenCV

LEARNING OUTCOMES¹ ~ 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 2 widely used C++ library :
OpenCV (a computer vision library)
Qt (a cross-platform application and UI framework)

FORM/S OF ASSESSMENT Written exam (25%), Practical works (50%), Acquired skills (25%)

ASSESSMENT CRITERION Written exam and Practical works

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

¹ The meaning of *keywords* in italic used to define Learning Outcomes are detailed in Annex.



Detail of criteria used to assess acquired skills :

- ~ Activities and questionnaires giving evidence of knowing (5%)
- ~ Activities and questionnaires giving evidence of comprehension/understanding (5%)
- ~ Activities and questionnaires giving evidence of analysis (5%)
- ~ Activities and questionnaires giving evidence of synthesis (5%)
- ~ Activities and questionnaires giving evidence of evaluation (5%)

Excellent	A
Very Good - above the average standard	B
Good - generally sound well	C
Satisfactory - but with significant shortcomings	D
Sufficient - performance meets the minimum criteria	E
Fail - some more work required	FX
Fail - considerable further work is required	F

The evaluation of informal learning outcomes will be based on questionnaires and laboratory notebook (self-evaluation, learning diary).

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
- ~ The Qt Documentation, <http://doc.qt.io/>