

C++ Programming

ECTS : 3

Description du contenu de l'enseignement :

This practical oriented course focuses on learning C++ language as a practical tool. It aims to be both an introduction to C/C++ and a basic course for whoever want to get an expertise in programming. A special care to practice is taken through solving simple issues C++ as a tool no special programming background is expected. The 2 last courses are dedicated to advanced topics, not mandatory to learn the language, but important for people with programming background especially C programmers. A good grasp of the previous lessons will be required. Course outline: 1. The basics

- Working with git
 - C++ first program, compilation chaintools, input and output
 - Variables and types, scopes, operators
 - Working with numbers: maths VS computers
 - Control structures
2. Express your algorithms using C++
- Functions (declaration, arguments, overloading)
 - lvalue and rvalue references
 - Namespace
 - Precompiler and macros
 - Program structure and build process
 - Application: closed-formulae for pricing
3. Programming with the STL
- Sequential containers
 - Associative containers
 - Algorithms, iterators, functors
 - Lambdas
 - Streams
4. Defining your own types
- Structures and classes
 - Value semantic
 - Conversions
 - Operator overloading
 - Application: data models in pricing libraries
5. Managing memory and low-level data structures
- Pointers and arrays
 - Pointer to method and functions
 - Three kinds of memory
 - Exceptions
6. Making your types abstract
- Inheritance and polymorphism
 - Entity semantic and Liskov Substitution Principle
 - Runtime Type Information
 - Multiple inheritance
 - Inheritance of implementation
 - Application: reusable numerical tools
7. Generic programming: write less, do more
- Template classes and specializations
 - Template functions, specialization vs overloading
 - Type deduction and auto
 - Universal references and perfect forwarding
 - Curiously Recurring Template Pattern
 - Traits

- Managing the overload resolution set
- Variadic templates and advanced metaprogramming

Compétence à acquérir :

Knowledge in C++ programming for finance

Bibliographie, lectures recommandées :

Beginners: Stanley B.Lippman, Josee Lajoie, Barbara Moo, "C++ Primer ", Fifth Edition, 2012. Koenig A. & B. E. Moo, "Accelerated C++", Addison-Wesley, 2000 Reference guides: Bjarne Stroustrup, "The C++ Programming Language", Fourth Edition, 2013. Nicolai M. Josuttis N. M., "The C++ standard library" 2nd edition, Addison-Wesley, 2012 Scott Meyers, "Effective STL", Addison-Wesley, 2001 Online Gurus: <http://www.drdobbs.com/>

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