Basics

* C++ standard
* Introduction: C++
* Setting up MSVC IDE
* Compiling and linking executables
* Data types
* Functional programming
* Input/output
* Declarations and Definitions
* **Pointers and References (Functions: passing by value and reference)**
* **Static vs. dynamic arrays**
* **Object oriented programming (creating objects).**

Intermediate

* Copy constructor, members, operators, mutators, accessors.
* MSVC Debugger
* Introduction to Inheritance, Polymorphism & Encapsulation in C++.
* Introduction to containers
* Introduction to objects (using objects)
* Overview of the standard template library (STL).
* Introduction to template functions
* Introduction to static and dynamic linking
* Polymorphism in C++
* Reference Counting and smart pointers
* Libraries (static).
* Inheritance: Pure virtual functions (Creating interface objects).
* Function objects. STL Library: erase(), algorithms.
* Also: switch, isnan, isinf. Revisiting header and source files.

Advanced

* More about memory management

Applications

* Factorial example
* Applied to linear systems and matrices.
* BLAS/LAPACK. Assembly and optimisation.
* Vectorisation/MMX/SSE/SSE2
* Sparse Matrix Formats
* Introduction to PETScmage processing and filters.