

## Schedule of lectures

This is the approximate schedule of lectures.

**Lecture 1:** pages 1–44.

1. Syllabus. Elements of C++: namespaces, inheritance and templates.
2. Elements of C++: errors and exceptions, STL, memory management and smart pointers.

**Lecture 2:** pages 45–60.

1. “Pimpl” idiom in software design. Design of function objects. Construction of function objects in cfl by an explicit formula. Example: shape curve for yield changes in Hull and White model for interest rates.
2. Interpolation and least square fitting. Examples: construction of discount curves by log linear interpolation and by least square fitting of market yields in Hull and White model.

**Lecture 3:** pages 61–93.

1. Key elements of arbitrage-free pricing theory: rollback operator and state process. The concept of “model implementation”.
2. Design of cfl library. Class `cfl::Slice`.

**Lecture 4:** pages 94–112.

1. Black model for a single stock. Class `cfl::AssetModel`.
2. Examples of pricing algorithms for options on a single stock: put, American put, barrier up-or-down-and-out, down-and-out American call, and swing.

**Lecture 5:** pages 113–125.

1. Hull and White model for interest rates. Class `cfl::InterestRateModel`.
2. Examples of pricing algorithms for derivatives on interest rates: cap, swaption, collar, down-and-out cap, and future on LIBOR.

**Lecture 6:** pages 211–239.

1. Pricing of path-dependent derivatives. Class `cfl::PathDependent`.
2. Examples of pricing algorithms for path dependent options: barrier up-or-down-and-out, asian call, savings account, and put on savings account.

**Lecture 7:** Review Session.