**Course name: Advanced Topics in Programming**

**Course Syllabus**

**Lecturer:** Mr. Yosef Halakhmi [**yhalahmi@post.tau.ac.il**](mailto:yhalahmi@post.tau.ac.il)

**Credit**: 4

**Prerequisites**:

Software Project in ‘C’

Knowledge in C++ or another OO language and Object Oriented Approach

**Course Objectives**:

The main goal of the course is to provide deep understanding of C++ internals - the look on some C++ features from the compiler point of view; how these features are implemented in compiler and why. To show, how this knowledge can help to write short and efficient code.

We’ll discuss the cost of C++ features and the ways to decrease resources needed for application ( memory, time ).

**General description**

The course is divided into following parts:

1. The brief pass through all features of C++ but on higher level ( example: no explanation what is the meaning of Constructor and Destructor, but the cost of these functions and ways to decrease number of there invocations will be discussed ).
2. Object Oriented Design
3. Design Patterns
4. Standard Template Library, C++ Streams,
5. Pitfalls, Tips

**Exercises**

* Exercises will be given once in two weeks.
* Students have to do assignments in pairs
* **The final grade is based on exam (65%) and assignments (35%).**

**Course Syllabus**:

* Brief C++ course
* Advanced C++
  + CTOR & DTOR – the look from Compiler point of view
  + Template Internals
  + Operator Overloading pitfalls
  + STL – Standard Template Library:
  + How to write efficient code using template mechanism
  + Uncaught Exceptions and recovery
  + Polymorphism Internals
  + Pointers to member-functions
  + Class Design

##### C++ tips and pitfalls

* Design Patterns
* Code Optimization

**Required reading**:

S.Lippman

C++ Primer

Second Edition,Addison-Wesley Publishing Company

Scott Meyers

Effective C++

Addison-Wesley Publishing Company

E.Gamma, R.Helm, R.Johnson, J.Vlissides

Design Patterns

Addison-Wesley Publishing Company

**Recommended reading**:

B.Stroustrup

The C++ Programming Language

Third Edition, Addison-Wesley Publishing Company, 2000

B.Stroustrup

The Design and Evolution of C++

Third Edition, Addison-Wesley Publishing Company, 1997

<http://www.cplusplus.com/reference/>

<http://www.parashift.com/c++-faq-lite/>

<http://www.doc.ic.ac.uk/lab/cplus/c++.rules/>