CMP1201 COMPUTER PROGRAMMING FUNDAMENTALS

Hours per Semester				Weighted Total Mark	Weighted Exam Mark	Weighted Continuous Assessment Mark	Credit Units
LH	PH	TH	CH	WTM	WEM	WCM	CU
30	60	00	60	100	60	40	4

Brief Course Description

The course provides a thorough understanding of the principles of well-structured and efficient programming in C/C++ fostering a productive and effective programming methodology appropriate for modern day engineering disciplines which require computer programming to carry out simulation, modeling, data gathering and analysis.

Course Objectives

By the end of the course students should be able to:

- Analyse a problem by decomposing it into distinct inputs, outputs and processes.
- Use stepwise refinement to design an algorithm from the problem analysis.
- Translate a correct algorithm design from pseudo-codes into a C/C++-program-coding
- Use programming environment (e.g. test editor, compilers etc) for development of C/C++-programs.

Detailed Course Content:

Intro to C/C++ : **[10 Hours]**
Basics, Control and Arrays, Pointers, Input / Output
Programming language fundamentals keywords, conditional flow control, iteration, function invocation, parameter passing, recursion, typing, scope, and memory management
Introduction to algorithm and complexity (searching and sorting, e.g., binary search, insertion sort, etc.)
Object-oriented programming (OOP): **[14 Hours]**
Philosophy, principles, and mechanisms (encapsulation, abstraction, inheritance, and polymorphism, OOP with C++: Structures, Classes, and Objects, member function and variables, constructor, destructor, function overloading, virtual functions, standard template library – STL, and very briefly exception handling, templates, operator overloading
Data structures: **[6 Hours]**
Linked list, queue, tree, stack, hash table; Software engineering formalism; advanced topics in data structure and algorithms;
Assignments will be in Numerical Methods Applications:
Least squares line, curve fittings; Fourier series and Trigonometric Polynomials; Iterative methods for linear systems: Newton's method, eigenvectors and eigenvalues. Solution of differential equations: Euler's method, Runge-Kutta and Predictor-Corrector methods,

Mode of Delivery

The course will be taught by using lectures, tutorials and assignments.

Assessment

Assignments, tests, laboratories, and final examination. Their relative contributions to the final grade are :

Requirement	**Percentage contribution**
Course work (Assignments, laboratories, tests)	40%
Final examination	60%
Total	**100%**

Learning Outcomes

On completion of this course the student should be able to:

- Describe how computer engineering uses or benefits from programming fundamentals.
- Identify the appropriate paradigm for a given programming problem.
- Use a suitable programming language to implement, test, and debug algorithms for solving simple problems.
- Describe the way a computer allocates and represents these data structures in memory.
- Outline the philosophy of object-oriented design and the concepts of encapsulation,

subclassing, inheritance, and polymorphism.

Method of Teaching /Delivery
The course will be taught by using lectures, tutorials and assignments.

Mode of Assessment
Assignments, tests and final examination. Their relative contributions to the final grade are :

Requirement	**Percentage contribution**
Course work (Assignments, tests)	40
% Final examination	60
% **Total**	**100%**

Recommended and Reference Books

[1] Herbert Schildt, 2003. *C++ from the Ground Up,* Third Edition, McGraw-Hill/Osborne, ISBN 0-07-222897-0

[2] Chuck Easttom, 2003. *C++ Programming Fundamentals*, Charles River Media, ISBN 158402371

[3] Bjarne Stroustrup, 2000. *The C++ Programming Language,* Addison-Wesley, ISBN 0-201-70073-5

[4] Michael T. Goodrich, Roberto Tamassio, David Mount, 1995. *Data Structures and Algorithms in C++,* John Wiley, ISBN 0-471-20208-8

[5] Robert Sedgewick, 2001. *Algorithms in C++,* Addison – Wesley, ISBN 0201510596

[6] Nell Dale, 2003. *C++ Data Structures,* Jones and Bartlett Publishers

Possible Lecturers:
Dr. D. Okello
Mr. S. Mwanje
Mr. A. Tumwesigye
Mr. P. I. Musasizi Mr. P. Serwanga