Title (Units): **COMP1005 Essence of Computing (3,2,2)**

Course Aims: This course provides students with an overview of Information & Communication Technologies, together with basic knowledge of computer-oriented problem solving methodologies, algorithm development, general programming concepts and design techniques. Programming methods are introduced in a problem-solving approach using a high-level programming language.

Upon completion, students are expected to have an exposure to various areas of STEM and Information & Communication Technologies. Students will gain experience in developing and implementing algorithms in a form of computer programs for solving real-world applications.

Prerequisite: Nil

Course Intended Learning Outcomes (CILOs):
Upon successful completion of this course, students should be able to:

No.	Course Intended Learning Outcomes (CILOs)
	Knowledge
1	Describe some fundamental concepts and real life applications in various areas of Information & Communication Technologies
2	Describe the general elements in programming using a high level programming language
3	Describe and explain the importance of programming development
	Professional Skill
4	Analyze computational problems for solving practical problems using a high level programming language
5	Formulate problems as steps so as to be solved systematically
	Attitude
6	Build up and apply analytical thinking in the context of ICT and programming

Calendar Description: This course provides students with an overview of Information & Communication Technologies, together with basic knowledge of computer-oriented problem solving methodologies, algorithm development, programming concepts and design techniques.

Teaching and Learning Activities (TLAs):

CILOs	Type of TLA
1-6	Students will attend lectures to learn different concepts in various areas of Information & Communication Technologies, as well as the general principles of programming and problem solving.
4-6	Students will attend laboratory sessions to gain practical exposure to various areas of Information & Communication Technologies and gain practical experience in programming.
4-6	Students will work on programming exercises and assignments to enhance what they have learnt.

Assessment:

No.	Assessment Methods	Weighting	CILOs to be addressed	Description of Assessment Tasks
1	Lab and Lecture Exercises	8%	1-6	Hands on exercises during lecture and lab sessions are designed to measure how well students have learned the basic conception of programming and problem solving.
2	Practical Tests	12%	4-6	Practical tests are designed to evaluate students' ability in using programming skills for problem solving.

3	Project	30%	4-6	Students will work on a project which involves the design and implementation of a game using a high level programming languages. This project is designed to assess the problem solving skills of students.
4	Examination	50%	1-5	Final examination questions are designed to see how far students have achieved their intended learning outcomes. Questions are designed to measure students' understanding on the fundamental concepts in various areas of Information & Communication Technologies. Analysis and skills-based questions will also be used to assess students' abilities in programming and problem solving.

Assessment Rubrics:

	Excellent (A)	**Good (B)**	**Satisfactory (C)**	**Marginal Pass (D)**	**Fail (F)**
Describe fundamental concepts and real life applications in various areas of Information & Communication Technologies	Fully understand the concepts and real life applications in various areas of Information & Communication Technologies	Understand most of the concepts and real life applications in various areas of Information & Communication Technologies	Sufficiently understand the concepts and real life applications in various areas of Information & Communication Technologies	Understand a minimum set of concepts and real life applications in various areas of Information & Communication Technologies	Do not understand most of the concepts and real life applications in various areas of Information & Communication Technologies
Describe the elements in programming using a high level programming language	Fully understand the elements in programming using a high level programming language	Understand most of the elements in programming using a high level programming language	Understand some of the elements in programming using a high level programming language	Understand a minimum set of the elements in programming using a high level programming language	Do not understand most of the elements in programming using a high level programming language
Describe and explain the importance of programming development	Fully understand the importance of programming development	Understand most of the importance of programming development	Understand some of the importance of programming development	Understand a minimum set of the importance of programming development	Do not understand most of the importance of programming development
Analyze computational problems for solving practical problems using a high level programming language	Capable to analyze computational problems for solving practical problems using a high level programming language	Capable to analyze computational problems for solving practical problems using a high level programming language	Capable to analyze computational problems for solving practical problems using a high level programming language most of the time	Capable to analyze computational problems for solving practical problems using a high level programming language in some selected scenarios	Not capable to analyze computational problems for solving practical problems using a high level programming language
Formulate problems as steps so as to be solved systematically	Fully capable to formulate and to solve problems systematically	Able to formulate and to solve most of the problems systematically	Able to formulate and to solve some of the problems systematically	Able to formulate and to solve a minimal set of problems systematically	Not able to formulate and to solve problems systematically

Course Content and CILOs Mapping:

Content		CILO No.
I	Programming Fundamentals	2, 3, 4, 5, 6
II	Digital Media Computing and Data Communications	1, 3, 4
III	Web Technology and Data Analysis	1, 3, 4

References:

- Daniel Shiffman, **Learning Processing: A Beginner's Guide to Programming Images, Animation, and Interaction (2nd Edition)**, Morgan Kaufmann, 2015.
- Casey Reas and Ben Fry, Getting Started with Processing, O'Reilly Media, 2010.
- Ben Fry, Visualizing data: Exploring and Explaining Data with the Processing Environment, O'Reilly Media, 2008.

Course Content:

Topic

I. Programming Fundamentals
   A. Primitive data types, operators and expressions
   B. Control structures
   C. Repetition structure such as for loops
   D. Composite structure such as arrays
   E. Programming style, program testing and documentation

II. Digital Media Computing and Data Communications
   A. Image processing applications and basic concepts behind
   B. Computer graphics, virtual reality and their applications
   C. Data communications and its applications

III. Web Technology and Data Analysis
   A. New opportunities from new Web technologies
   B. Basic concepts in Web technology and architecture
   C. Data analysis and its applications