COURSE SYLLABUS

CS310 : Foundations of Computer Science

COURSE DESCRIPTION

Credit points	3 credits (45 hrs)	
Level	Undergraduate	
Instructor	Dinh Thi Ha Ly, PhD, Department of Computer Engineering, School of Information and Communication Technology Hanoi University of Science and Technology	
Teaching time **Location**	27/09/2024 – 03/01/2025 Hanoi University of Science and Technology	
Prerequisites	MTH 1112	
Recommended background knowledge		
Subject description	A broad perspective of computer science concepts intended as preparation for more in-depth coverage in higher-level courses. Topics include machine and assembly language programming, computer system organization and operation, logic circuits, finite-state diagrams and programming language grammar, Boolean algebra, and circuit design considerations.	
Objectives & Out-come	Introduction to information technology and computer science. Computer science: definition, theory, and applications. Algorithmic foundations of computer science. Representing algorithms, pseudocode, sequential operations, efficiency, and attributes of algorithms. System Software. Assemblers and assembly language. Operating systems. Introduction to high-level language programming. Computer systems organization. binary numbers, Boolean logic and gates.	
Assessment/ Evaluation	Attendance/Attitude	10%
	Group presentation	20%
	Mid-term exam	30%
	Final exam	40%
Prescribed Textbook(s)	[1] Invitation to Computer Science, 7th Edition, G.Michael Schneider, Judith Gersting, 2015. [2] Introduction to Logic Design, 3rd Edition, Alan B. Marcovitz, McGraw-Hill, 2010.	

COURSE CONTENTS & SCHEDULE

Class No.	Contents	No. of Hours			Ref./Resources	Assignment(s)
		Lect.	Exr.	Prc.		
1	**Course Introduction and Orientation** **Chapter 1: Introduction** 1.1 Introduction 1.2 Computer Science: Definition, Theory and Applications 1.3 A Brief History of Computing 1.4 Some of the Major Advancements in Computing	3			Chapter 1 [Textbook 1]	2
2	**Chapter 2: Algorithmic Foundations of Computer Science** 2.1 Introduction 2.2 Representing Algorithms 2.3 Pseudocode 2.4 Sequential Operations	3			Chapter 2 [Textbook 1]	2
3	2.5 The Efficiency of Algorithms 2.6 Attributes of Algorithms 2.7 Measuring Efficiency 2.8 Order of Magnitude—Order n 2.9 Order of Magnitude—Order n2 2.10 Analysis of Algorithms	3			Chapter 3 [Textbook 1]	3
4	Exercise and in-class assignment		3			Assignment 1
5	**Chapter 3: System Software and Virtual Machines** 3.1 Introduction 3.2 System Software 3.3 The Virtual Machine 3.4 Types of System Software 3.5 Assemblers and Assembly Language 3.6 Operating Systems	3			Chapter 6 [Textbook 1]	2
6	**Chapter 4: High-Level Language Programming**	3			Chapter 9 [Textbook 1]	2

	4.1 The Language Progression 4.2 A Family of Languages 4.3 Feature Analysis 4.4 Meeting Expectations					
7	4.5 Software Engineering 4.6 The Software Development Life Cycle 4.7 Procedural Languages (Fortran, COBOL, C/C++, Ada, Java, Python, C# and .NET) 4.8 Special-purpose Languages (SQL, HTML)	3			Chapter 9, 10 [Textbook 1]	1
8	Assignment 1 submission Practice and in-class assignment		3			Assignment 2
9	**Mid-term exam** Exam solution		3			
10	**Chapter 5: The Building Blocks: Binary Numbers, Boolean Logic, and Gates** 5.1 Introduction 5.2 The Binary Numbering System 5.2.1 Binary Representation of Numeric and Textual Information 5.2.2 Binary Representation of Sound and Images 5.2.3 The Reliability of Binary Representation 5.2.4 Binary Storage Devices	3			Chapter 4 [Textbook 1]	2
11	5.3 Boolean Logic and Gates 5.3.1 Boolean Logic 5.3.2 Gates 5.4 Combinational and Sequential Circuits	3				2
12	**Chapter 6: Computer Systems Organization** 6.1 Introduction 6.2 The Components of a Computer System 6.2.1 Memory and Cache 6.2.2 Input/Output and Mass Storage 6.2.3 The Arithmetic/Logic Unit 6.2.4 The Control Unit	3			Chapter 5 [Textbook 1]	2

13	6.3 Putting All the Pieces Together—the Von Neumann Architecture 6.4 Non–Von Neumann Architectures	3				Assignment 3: Group presentation
14	**Group presentation**		3			
15	**Final exam** Exam solution		3			

Notes:

- *Abbreviation: Lect. (lecture), Exr. (Exercise), Prc. (Practise).*
- *Exercises may include assignment, reports, student's presentation, homework, class exercises... for each class sessions.*
- *Practical mostly refer to Lab-work or outside practice such as field trip.*
- *Assignments may include assignments, practical work, reports, exercises ...for each class sessions*

Reference Literature:

[1] Invitation to Computer Science, 7th Edition, G.Michael Schneider, Judith Gersting, 2015.
[2] Introduction to Logic Design, 3rd Edition, Alan B. Marcovitz, McGraw-Hill, 2010.