Course Description and Plan

Addis Ababa Science and Technology University						
1	**College: Electrical and Mechanical Engineering**		**Department: Software Engineering**			
2	Course Category	Core Course	Category Code: 1			
	Course Name	Introduction to Software Engineering and Computing				
	Course Code:	SWEG2101				
3	Synopsis:	Software engineering is a discipline that allows us to apply engineering and computer science concepts in the development and maintenance of reliable, usable, and dependable software. The purpose of this course is to present a general introduction to software engineering and computing. The course is designed to equip students with theoretical and practical aspects of fundamentals of computing and software engineering by furnishing them with a broad oversight of software engineering concepts and principles in parallel with the software development life cycle. The course will begin with an introduction to computing, giving definition, characteristics, types, application of computer system, components of computing system. The students then will able to make use of computer system, learn data representation in computer system followed by numbering system, binary arithmetic, and digital logic gate and computer system architecture. The students will go on to learn about software engineering evolution, principles, applications, impact of software on economic, societal and environmental safety and Software Engineering Professional Practice. The students will also learn about Software Development Life Cycle (SDLC), methodologies of software engineering, software development paradigms, trends and CASE tools. Moreover, the students will learn about data communication and computer networks followed by computer system security to introduce students with potential security threats to computer system and methods to safeguard it.					
4	Name(s) of Academic Staff:	Chere Lemma (M.Tech)				
5	Semester and Year offered:	Semester:	I	Year:	2	
6	Credit Hour:	4				
7	Prerequisite/ Co-requisite: (if any)	None				

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Course Learning Outcome (CLO): At the end of the course the student will be able to:

CLO1	Discuss computer system components, organization, data representation and coding standards.
CLO2	Demonstrate installation and configuration of system software, and make use of application programs and software engineering tools.
CLO3	Describe and discuss software engineering concepts, principles, practice, and software development process and methodologies.
CLO4	Develop an algorithms to solve small-scale problems using development techniques (flow charts, pseudo code).
CLO5	Explain fundamental concept of computer networks, data communication, and computer system security and setup small-area network.
CLO6	Recognize the professional, ethical, and norm of software engineering practice.

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Mapping of the Course Learning Outcomes (CLO) to the program Learning Outcomes (LO), Teaching Methods and Assessment:

Course Learning Outcomes (CLO)	Program Learning Outcomes (PO)												Teaching Methods				Assessment				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	L	T	P	O	Test	Quiz	Assignment	Project	Lab-report
CLO1	√												√			√	√	√	√		
CLO2					√										√	√					√
CLO3					√								√			√	√		√		
CLO4		√											√		√	√		√	√		
CLO5			√										√		√	√	√		√		√
CLO6								√					√			√			√		

**Indicate the relevancy between the CLO and PO by ticking "√"on the appropriate relevant box

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Transferable Skills (if applicable)
(Skills learned in the course of study which can be useful and utilized in other settings)

1	Team work and collaboration
2	Communication skills
3	Critical thinking and Problem solving-skills
4	Time and resource management
5	Independent learning

11	**Distribution of Student Learning Time (SLT)**								
	Course Content Outline	CLO	Teaching and Learning Activities						Total (SLT)
			Guided learning (F2F)				Guided Learning (NF2F)	Independent Learning (NF2F)	
			L	T	P	O			
	Chapter 1: An Overview of Computer System								
	1.1 Definition, Characteristics, Generation and Types of Computer 1.2 Applications of modern computers and future computing trends 1.3 Components of computing system • Computing hardware trends • Software Vs. program • Software Applications • Characteristics of good Software • Types and Classes of Software 1.4 Software development process • Software development life cycle (SDLC) 1.5 Problem solving using computers • Defining problem in context of software solution • Basics of Algorithms Design (Pseudo code and Flowchart) • Practice flowchart drawing tools • Design algorithm for small-scale problems 1.6 Practice the use of computer • Identify computer hardware components • Install and configure system and application software • Software Virtualization • Use word processing application	CLO1 CLO2 CLO3 CLO4	10hrs	—	15hrs	4hrs	3hrs	12hrs	44hrs

	Chapter 2: Data Representation and Basics of Computer architecture							
	2.1 Numbering system concepts 2.2 Unit of computer data representation 2.3 Number systems conversion 2.4 Binary Arithmetic 2.5 Character coding standards (BCD4, EBCDIC, ASCII7 & 8, UNICODE) 2.6 Number representation (Negative & floating number) 2.7 Basics of digital logic gates and Boolean algebra 2.8 An overview of computer architecture • Basics of Computer organization and architecture • Types of computer organization and architecture	CLO1	8hrs	_	_	2hrs	2hrs	6hrs	18hrs
	Chapter 3: Introduction to Software Engineering							
	3.1 Software Engineering Overview • Definition of software Engineering • Evolution software Engineering • Software Engineering vs computer science 3.2 The need for and the impact of software on economic, societal and environmental safety. 3.3 Software Engineering Professional Practice • Professionalism, accreditation, certification, and licensing • Codes of ethics and professional conduct • Social, legal, historical, and professional issues and concerns • The nature and role of professional societies and software engineering standards	CLO3 CLO6	3hrs	_	_	3hrs	2hrs	6hrs	14hrs

	Chapter 4: Software Development Methodologies and Paradigms							
	4.1 Software Engineering principles and practice 4.2 Software Engineering Methodologies • *Heuristic Methods* • *Formal Methods* • *Prototyping Methods* • *Agile Methods* 4.3 Software development paradigms and trends 4.4 Computer Aided Software Engineering (CASE) • An overview of CASE tools • Demonstration of CASE tools	CLO3	5hrs	__	6hrs	3hrs	3hrs	8hrs	25hrs
	Chapter 5: Introduction to Computer Networks							
	5.1 Basics of data communication, Data transmission and Communication modes 5.2 Computer networks and its application 5.3 Types of computer networks 5.4 Components of Computer network ✓ Hardware and software ✓ Network models and topologies ✓ Transmission media 5.5 The internet and web concepts 5.6 Web browsing and searching techniques	CLO5	6hrs	__	9hrs	1hr	2hrs	6hrs	24hrs
	Chapter 6: Computer system security							
	6.1 Basics of Data privacy 6.2 An overview of computer system security 6.3 Types of security threats 6.4 Computer security policies, and 6.5 Security threats detection and prevention mechanism	CLO5	3hrs	__	__	1hr	2hrs	3hrs	9hrs
	Total		**79 Hrs.**				**55 Hrs.**		**134 Hrs.**

12	**Assessment**					
	Continuous Assessment		Percentage Total-50(%)	F2F	NF2F	SLT
	1	Assignments	20%	1hr	10hrs	11hrs
	2	Tests	15%	1.5hr	3hrs	4.5hrs
	3	Lab-report	10%	2hr	8hrs	10hrs
	4	Quize	5%	0.5hr	___	0.5hr
	Final Exam					
	1	Final Exam	50%	2 hrs.	4hrs	6hrs
					Assessment Total	**32hrs**
					Grand Total SLT	**166hrs**
	L = Lecture, T = Tutorial, P = Practical, O = Others, F2F = Face to Face, NF2F = Non Face to Face Note: indicates the CLO based on the CLO's numbering in item 9.					

13	Special requirements and resources to deliver the course (e.g. software, computer lab, simulation room …etc.)	1	Computer Lab
		2	Software
14	Text book and reference: (note: ensure the latest edition /publication)	1	Course Hand-book and lab manual
		2	A. B. Chaudhuri (2020), Flowchart and Algorithm Basics: The Art of Programming: The Art of Programming; Mercury Learningand InforMation LLC., 2020
		3	Ian Sommerville (2018) Software Engineering, 10th Edition; Pearson Education Limited.
		4	Sue Conger's (2008), The New Software Engineering: A Global Text, Switzerland, 2008
		5	Rod Stephens (2015), Beginning Software Engineering, Canada: John Wiley & Sons, Inc, c2015
		6	Behrouz A. Forouzan (2013); Data Communications and Networking, 5th edition, New York, NY : McGraw-Hill, c2013
		7	Journal Articles and Internet resource (Tutorials on YouTube, slideshare, tutorialspoint, Javapoint, Computer networking notes)