Adama Science and Technology University						
1	School: **Electrical Engineering and Computing**			Department: **Computer Science and Engineering**		
2	Course Category	Basic Mandatory				
	Course Name	**Introduction to Emerging Technologies**				
	Course Code:	**CSEg1102**				
3	Synopsis:	This course will enable students to explore current breakthrough technologies in the areas of Artificial Intelligence, Internet of Things and Augmented Reality, Data Science and other technologies that have emerged over the past few years. Besides helping learners become literate in emerging technologies, the course will prepare them to use technology in their respective professional preparations.				
4	Name(s) of Academic Staff:					
5	Year and Semester offered:	Year:	I	Semester:	II	
6	Credit Hour:	3				
7	Prerequisite/ Co-requisite: (if any)	Basic General Knowledge about latest computer engineering technologies and developments				

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

CLO1	Identify different emerging technologies
CLO2	Recognize various emerging technologies and tools.
CLO3	Discuss ethical and professional issues of emerging technologies
CLO4	Differentiate different emerging technologies.

9 Mapping of the course Learning Outcomes to the program Learning Outcomes, Teaching Methods and Assessment:

Course Learning Outcomes (CLO)	Program Learning Outcomes (PO)								Teaching Methods				Assessment				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	L	T	P	O	Test	Quiz	Assignme	Mid	Final
CLO1	√								√			√	√		√	✓	✓
CLO2	√								√			√		√		√	✓

	CLO3						√			√			√	√		√	✓	✓
	CLO4	√								√			√	√		√		✓
	Indicate the relevance between the CLO and PO by ticking "√"on the appropriate relevant box																	

10	Transferable Skills (if applicable) (Skills learned in the course of study which can be useful and utilized in other settings)	
	1	
	2	
	3…etc.	

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: Introduction to Emerging Technologies	CLO1							9hr
	Evolution of technologies Introduction to Industrial revolution o Historical background (IR 1.0, IR 2.0, IR 3.0) o Fourth industrial revolution (IR 4.0)								
	Role of data for Emerging technologies								
	Enabling devices and networks for emerging technologies (programmable devices)								
	Human to Machine Interaction								
	Future trends in emerging technologies								
	Chapter 2 : Introduction to Data Science	CLO2							9hr

	Overview for Data Science o Definition of data and information o Data types and representation								
	Data Value Chain o Data Acquisition o Data Analysis o Data Curating o Data Storage o Data Usage								
	2.1 Basic concepts of Big data								
	Chapter 3: Artificial Intelligence(AI)	CLO2							10hr
	3.1 Introduction to AI o What is AI o History of AI o Levels of AI o Types of AI								
	3.2 Applications of AI o Agriculture o Health o Business (Emerging market) o Education								
	3.3 AI tools and platforms (eg: scratch/object tracking)								
	3.4 Sample application with hands on activity (simulation based)								
	Chapter 4: Internet of Things(IoT)	CLO2							9hr
	4.1 Overview of IOT o What is IOT? o History of IOT o Advantages of IOT o Challenges of IOT								

	4.2 How IOT works o Architecture of IOT o Devices and network								
	4.3 Applications of IOT o Smart home o Smart grid o Smart city o Wearable devices o Smart farming								
	4.4 IOT tools and platforms (eg: KAA IoT /Device Hive/Zetta/Things Board…)								
	4.5 Sample application with hands on activity (eg IOT based smart farming)								
	Chapter 5: Augmented Reality (AR)	CLO2							10hr
	5.1 Introduction to AR								
	5.2 Virtual reality (VR) , Augmented Reality(AR) vs mixed reality (MR)								
	5.3 Architecture of AR systems.								
	5.4 Application of AR systems (education, medical, assistance, entertainment) workshop oriented hands demo								
	Chapter 6 :Ethics and professionalism of emerging technologies	CLO3							6hr
	6.1 Technology and ethics								
	6.2 Digital privacy								
	6.3 Accountability and trust 6.4 Treats and challenges								
	Chapter 7 Other emerging technologies	CLO4							15hr
	7.1 Nanotechnology								
	7.2 Biotechnology								

	7.3 Block chain technology								
	7.4 Cloud and quantum computing								
	7.5 Autonomic computing								
	7.6 Computer vision								
	7.7 Embedded systems								
	7.8 Cyber security								
	7.9 Additive manufacturing (3D Printing)								
	Total							68hr	

Assessment					
Continuous Assessment		% Total-60(%)	F2F	NF2F	SLT
1	**Assignment I**	(10%)	2hr	6hr	8hr
2	**Assignment II**	(10%)	2hr	6hr	8hr
4	**Test**	(10%)	1hr	6hr	7hr
5	**Quiz**	5%	1hr	3hr	4hr
6	**Mid Exam**	25%	2hr	8hr	10hr
				Total	**37hr**
Final Exam		Percentage 50 (%)	F2F	NF2F	SLT
Final Exam		40%	3hr	12hr	15hr
				Grand Total SLT	**120hr**

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	Text book and reference: (note: ensure the latest edition /publication)	1	● Follett, J. (2014). Designing for Emerging Technologies: UX for Genomics, Robotics, and the Internet of Things: O'Reilly Media.
		2	● Jung, T., &Dieck, M. C. t. (Eds.). (2018). Augmented Reality and Virtual Reality: Empowering Human, Place and Business