CSE1006 Blockchain and Cryptocurrency Technologies						L	T	P	J	C
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Pre-requisite	This course has no formal pre-requisite					**Syllabus version**				
						v. 1.0				

Preamble

This course is an introductory course to Blockchain and crypto currency. It answers how Blockchain and cryptocurrency work? What makes them different? How secure are they? How anonymous are their users? What determines the price of them? Can cryptocurrencies be regulated? What might be the future hold?

Course Objectives:

- Understanding the mechanism of Blockchain and Cryptocurrency
- Understanding why current implementations work
- Understanding the necessary cryptographic background
- Exploring applications of Blockchain to cryptocurrencies and beyond Understanding limitations of current Blockchain
- Introduction to recent research

Expected Course Outcome:

- After successfully completing the course the student should be able to understand how Blockchain works and the ideas, technologies sprouting from it.

Student Learning Outcomes (SLO):	**9, 17**		
Module:1	**Introduction to Cryptography & Cryptocurrencies**	**5 hours**	**SLO:** 17

Cryptographic Hash Functions, Hash Pointers and Data Structures, Digital Signatures, Public Keys as Identities, A Simple Cryptocurrency.

Module:2	**How Blockchain Achieves & How to Store and Use**	**7 hours**	**SLO: 17**

Decentralization-Centralization vs. Decentralization-Distributed consensus, Consensus without identity using a block chain, Incentives and proof of work.

Simple Local Storage, Hot and Cold Storage, Splitting and Sharing Keys, Online Wallets and Exchanges, Payment Services, Transaction Fees, Currency Exchange Markets.

Module:3	**Mechanics of Bitcoin**	**5 hours**	**SLO: 17**

Bitcoin transactions, Bitcoin Scripts, Applications of Bitcoin scripts, Bitcoin blocks, The Bitcoin network, Limitations and improvements.

Module:4	**Bitcoin Mining**	**5 hours**	**SLO: 17**

The task of Bitcoin miners, Mining Hardware, Energy consumption and ecology, Mining pools, Mining incentives and strategies

Module:5	**Bitcoin and Anonymity**	**5 hours**	**SLO: 9, 17**

Anonymity Basics, How to De-anonymize Bitcoin, Mixing, Decentralized Mixing, Zerocoin and Zerocash.

Module:6	**Community, Politics, and Regulation**	**9 hours**	**SLO: 9, 17**

Consensus in Bitcoin, Bitcoin Core Software, Stakeholders: Who's in Charge, Roots of Bitcoin, Governments Notice on Bitcoin, Anti Money Laundering Regulation, New York's BitLicense Proposal.

Bitcoin as a Platform Bitcoin as an Append only Log, Bitcoins as "Smart Property", Secure Multi-Party Lotteries in Bitcoin, Bitcoin as Public Randomness, Source-Prediction Markets, and Real World Data Feeds.			
Module:7	**Altcoins and the Cryptocurrency Ecosystem**	**7 hours**	**SLO: 17**
Altcoins: History and Motivation, A Few Altcoins in Detail, Relationship Between Bitcoin and Altcoins, Merge Mining-Atomic Cross-chain Swaps-6 Bitcoin-Backed Altcoins, "Side Chains", Ethereum and Smart Contracts.			
Module:8	Recent Trends & applications	**2 hours**	**SLO: 17**
	Total Lecture hours:	**45 hours**	

Text Book(s)	
1.	Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. (2016). *Bitcoin and cryptocurrency technologies: a comprehensive introduction*. Princeton University Press.
Reference Books	
1.	Antonopoulos, A. M. (2014). *Mastering Bitcoin: unlocking digital cryptocurrencies*. "O'Reilly Media, Inc.".
2.	Franco, P. (2014). *Understanding Bitcoin: Cryptography, engineering and economics*. John Wiley & Sons.

Mode of evaluation: CAT-1, CAT-2, FAT			
Recommended by Board of Studies	10- 08-2018		
Approved by Academic Council	No. 52	Date	14-09-2018