



INTRODUCTION TO BLOCKCHAIN TECHNOLOGY AND APPLICATIONS

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TYPE OF COURSE : New | Elective | PG

COURSE DURATION : 8 weeks (24 Feb' 20 - 17 Apr' 20)

EXAM DATE : 25 Apr 2020

INTENDED AUDIENCE : Computer science, IT

PREREQUISITES : Substantial programming experience, software engineering

COURSE OUTLINE :

Blockchain is an emerging technology platform for developing decentralized applications and data storage, over and beyond its role as the technology underlying the cryptocurrencies. The basic tenet of this platform is that it allows one to create a distributed and replicated ledger of events, transactions, and data generated through various IT processes with strong cryptographic guarantees of tamper resistance, immutability, and verifiability. Public blockchain platforms allow us to guarantee these properties with overwhelming probabilities even when untrusted users are participants of distributed applications with ability to transact on the platform. Even though, blockchain technology has become popularly known because of its use in the implementation of Cryptocurrencies such as BitCoin, Ethereum, etc., the technology itself holds much more promise in various areas such as time stamping, logging of critical events in a system, recording of transactions, trustworthy e-governance etc.

ABOUT INSTRUCTOR :

Professor Sandeep K. Shukla is an IEEE fellow, an ACM Distinguished Scientist, and has served as an IEEE Computer Society Distinguished Visitor during 2008-2012, and was an ACM Distinguished Speaker during 2007- 2014. He is currently the Editor-in-Chief of ACM Transactions on Embedded Systems, and associate editor for ACM transactions on Cyber Physical Systems. In the past, he has been associate editors for IEEE Transactions on Computers, IEEE Transactions on Industrial Informatics, IEEE Design & Test, IEEE Embedded Systems Letters, and many other journals. He has guest-edited more than 15 special issues for various IEEE and ACM journals.

COURSE PLAN :

Week 1 : Introduction – basic ideas behind blockchain, how it is changing the landscape of digitalization, introduction to cryptographic concepts required

Week 2 : Hashing, public key cryptosystems, private vs public blockchain and use cases, Hash Puzzles, Introduction to Bitcoin Blockchain

Week 3 : Bitcoin Blockchain and scripts, Use cases of Bitcoin Blockchain scripting language in micropayment, escrow etc Downside of Bitcoin – mining .

Week 4 : Alternative coins – Ethereum and Smart contracts

Week 5 : Alternative coins – Ethereum continued, IOTA

Week 6 : The real need for mining – consensus – Byzantine Generals Problem, and Consensus as a distributed coordination problem – Coming to private or permissioned blockchains – Introduction to Hyperledger

Week 7 : Permissioned Blockchain and use cases – Hyperledger, Corda

Week 8 : Uses of Blockchain in E-Governance, Land Registration, Medical Information Systems, and others