



Course Title: Blockchain Technology and Its Applications

Course Code: CS 03

Course Dates: July 18 - August 22

Instructor: Ahmed Banafa (Professor of Engineering, San Jose State University)

Class Sessions and Recording

Meeting days and times: Mondays, 7:00-9:00 p.m. (PT)

Meeting location: Zoom

The class sessions will be recorded

Course Summary:

Blockchain is an emerging technology that can radically improve security in banking, supply chain, and other transaction networks. Essentially, it provides the basis for a dynamic distributed ledger that can save time when recording transactions between parties, remove costs associated with intermediaries, and reduce risks of fraud and tampering. This course explores the fundamentals and applications of blockchain technology. Students will learn about the decentralized peer-to-peer network, distributed ledger, and trust model that define blockchain technology. We will examine the basic components of blockchain (transaction, block, block header, and the chain), its operations (hashing, verification, validation, and consensus model), underlying algorithms, and the essentials of trust (hard fork and soft fork). We will look at private and public blockchain networks similar to Bitcoin and Ethereum, as well as concepts of smart contracts, proof of work, and proof of stake. Finally, we will address the relationships among blockchain technology, Internet of Things, artificial intelligence, cybersecurity, quantum computing, and digital transformation. The concepts of NFT and Fintech will be covered, the course also will include practical cases, videos, and guest speakers from the industry. By the end of the course, students will understand the inner workings and applications of this disruptive technology and its potential impact on all aspects of the business world and society. *No prerequisites or coding experience required.*

Instructor Bio: Prof. Ahmed Banafa, **Professor of Engineering, San Jose State**

Ahmed Banafa's work focuses on blockchain, Internet of Things, and artificial intelligence. He is the author of 3 books, *Secure and Smart IoT Using Blockchain AI*, *Blockchain Technology and Applications* and *Quantum Computing*, which is forthcoming. Banafa studied electrical engineering at Lehigh

**Please see course page for full description and additional details.*

Grade Options and Requirements:

- No Grade Requested (NGR)
 - This is the default option. No work will be required; no credit shall be received; no proof of attendance can be provided.
- Credit/No Credit (CR/NC)
 - Students must attend at least 80% of class sessions.
- Letter Grade (A, B, C, D, No Pass)
 - Students must attend at least 80% of class sessions and complete a piece of written work (to be discussed further in class).

**Please Note: If you require proof that you completed a Continuing Studies course for any reason (for example, employer reimbursement), you must choose either the Letter*

Grade or Credit/No Credit option. Courses taken for NGR will not appear on official transcripts or grade reports.

Tentative Weekly Outline:

Week1 July 18th

Introduction and class policies

Introduction to current centralized systems

Structure of Blockchain

Examples of Blockchain

Class Discussions

Reading: Class Notes and Ch.1,2,3 of “Blockchain Technology and Applications” Book

Week2 July 25th

Principles of Blockchain Technology

Nodes and different networks of Blockchain

Verification process

Proof of Stake vs. proof of work

Encryption

Class Discussions

Reading: Class Notes and Ch. 4,5,6 of “Blockchain Technology and Applications” Book

Week 3 August 1st

Blockchain beyond the Hype

What is cryptocurrency?

Bitcoin, Ethereum, NFT, and DeFi

Smart Contract concept

Financial and non-finical applications of Blockchain

Class Discussions

Reading: Class Notes and Ch. 7, 8 of “Blockchain Technology and Applications” Book

Week4 August 8th

Cybersecurity and Blockchain

Advantages of using Blockchain in Cybersecurity

Disadvantages of using Blockchain in Cybersecurity

Class Discussions

Reading: Class Notes and Ch.9,10 of “Blockchain Technology and Applications” Book

Week 5 August 15th

IoT and Blockchain Challenges and Risks

Scalability issues

Processing power and time Storage

Class Discussions

Reading: Class Notes and Ch.11,12 of “Blockchain Technology and Applications” Book

Week 6 August 22nd

Myths about Blockchain Technology

Blockchain and AI

Blockchain and Digital Transformation

Class Discussions

Reading: Class Notes and Ch.13,14,15 of “Blockchain Technology and Applications” Book

Research Paper or Exam
