Course Number	CS 515	Course Title	Computational Blockchain
Semester Hours	3	Course Coordinator	Henry Hexmoor
Catalog Description	This course introduces fundamentals of modern blockchain-based systems as well as cryptocurrency applications. Topics for discussion include consensus and distributed computing, smart contracts, privacy and secrecy, and other relevant computational platforms. Non-currency applications of blockchains, and legal and social implications will be outlined. Students will be required to develop a term project. Prerequisites: CS 330 with grade of C or better or CS 410 or graduate standing.		

Textbooks

The instructor will provide all required material.

References

Course Learning Outcomes

- Learn the fundamentals of mathematical modeling of Cryptographic Blockchain
- Familiarize with common cryptocurrencies and their common applications

Assessment of the Contribution to Student Outcomes

Outcome →	1	2	3	4	5	6	7
Assessed →		X	X	X	X		X

Prerequisites by Topic

CS 330 with grade of C or better or CS 410 or graduate standing.

Major Topics Covered in the Course

1. **Cryptographic fundamentals (15 lectures)**:
    a. Classical Cryptography
    b. The Elliptic Curve Cryptography
    c. The Quantum Cryptography
2. **Blockchain for Managers (5 lectures)**:
    a. Basic Terms and Processes
    b. Digital Wallets
    c. Common Applications
    d. Consensus Algorithms
3. **Data Structures (10 lectures):**
    a. Hash Pointers
    b. Merkle trees
    c. Digital Signatures
4. **Smart Contracts (10 lectures):**
    a. Routing Packets
    b. EV charging