Course Outline

1. Document Information

Degree Program	Computer Science
Course Number	CS 515
Course Title	Computational Blockchain
Semester Hours	3
Course Coordinator	Henry Hexmoor
Revision Term	Spring 2021
Latest Revision	Fall 2021

2. 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.

3. Textbooks

- The instructor will provide all required material.

4. References

5. Course Learning Outcomes

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

6. Assessment of the Contribution to Student Outcomes

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

7. Prerequisites by Topic

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

8. 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