CIS 100 - Introduction to Blockchain, Cryptocurrencies, and Identity

COLLEGE:
Merritt College

ORIGINATOR: Brown, Courtney

DIVISION/DEPARTMENT:
Merritt - Division II/M - Technology

STATE CONTROL NUMBER: CCC000599568

DATES:
BOARD OF TRUSTEES APPROVAL DATE: 10/22/2019
STATE APPROVAL DATE: 01/05/2019
CURRICULUM COMMITTEE APPROVAL DATE: 05/16/2019
REQUISITE VALIDATION:

CURRENT EFFECTIVE DATE: 08/01/2019

1. REQUESTED CREDIT CLASSIFICATION:

D - Credit - Degree Applicable

N - Not Basic Skills

2 - Not Program Applicable

2. DEPT/COURSE NO:

CIS 100

3. COURSE TITLE:

Introduction to Blockchain, Cryptocurrencies, and Identity

4. COURSE:

Course
MC New Course w/DE Addendum

TOP NO. 0707.10 - Computer Programming*

5. UNITS:

Variable No

Units (Min) 3.000

Min Total

Hours

Lecture Hours (Min) 2.000

35

Lab/Studio/Activity Hours (Min) 3.000

52.5

6. SELECTED TOPIC:

NO. OF TIMES OFFERED AS SELECTED TOPIC:

AVERAGE ENROLLMENT:

7. JUSTIFICATION FOR COURSE:

Blockchain is one of the most significant technologies to impact law and business in many years. This introductory course familiarizes students with the underlying data structure that forms the basis of blockchain and the applications of its properties to real-world solutions and transactions. This enables the college to offer new curriculum that prepares students to enter workforce in emerging industries that utilize this technology.

8. COURSE/CATALOG DESCRIPTION

Fundamental principles of distributed hash data structures: Overview of applications that use blockchain in cryptocurrencies (Bitcoin and Ethereum); analysis of public records and smart contracts to establish proof of ownership and identity; and exploration of current and potential real-world applications of blockchain in technology, business, and law.

9. OTHER CATALOG INFORMATION

a. Modular: No

If yes, how many modules:

b. Open entry/open exit: No

c. Grading Policy: Both Letter Grade or Pass/No Pass

d. Eligible for credit by Exam: No

e. Repeatable according to state guidelines: No

f. Required for degree/certificate (specify):

g. Meets GE/Transfer requirements (specify):

h. C-ID Number:

Expiration Date:

i. Are there prerequisites/corequisites/recommended preparation for this course? Yes

10. LIST STUDENT PERFORMANCE OBJECTIVES (EXIT SKILLS):

If an Objective cannot be deleted, make sure a Content-Review found in the Content Validation Page is not using that objective.

Objectives

1. **Distinguish between cryptocurrencies**
2. **Store cryptocurrency**
3. **Exchange cryptocurrency with another party**

11. COURSE CONTENT:

LECTURE CONTENT:

- Introduction to Cryptography and Cryptocurrency (10%)

  Mathematics and the use of one-way mathematics functions to provide security

  Cryptography categories and Public Key Infrastructure

  Double-spending, transactions, and non-refutability

- How Blockchain Achieves Decentralization (10%)

  Relationship between features and underlying data structures

  Data consistency and rate of propagation

- Mechanics of Bitcoin (10%)

  Computational difficulty and value creation

  Proof-of-Work

- How to Store and Use Bitcoin (10%)

  Wallets and storage mechanisms

  Redemption and exchange

- Mining (10%)

  Computation and creation of a transaction block

  Time, computation, and power consumption in search for value

- Anonymity (10%)

  Concepts of Identity

  Proof of claim

  Validation of ledger entry

- Community, Politics, and Regulation (10%)

  Role of intermediaries in exchange

  Creation and disruption of Markets

- Blockchain as a Platform (10%)

  Smart contracts and distributed ledger

Discoverable services and published capabilities

- Cryptocurrency Ecosystems (10%)

  Multi-modal money

  Preservation of value

- Decentralized Institutions and the Future (10%)

  Role of central banks in modern economy

  Peer-to-peer norms and practices

  Organizational behavior and individual behavior

LAB CONTENT:
Exchanging Cryptocurrencies (18%)

- Transactions, Blocks, Mining, and Blockchain
- Bitcoin Transactions
- Constructing a Transaction
- Mining Transactions in Blocks
- Spending Transactions

Storing Cryptocurrencies (18%)

- Bitcoin Addresses
- Implementing Keys and Addresses in Python
- Wallets
- Advanced Keys and Addresses

The Blockchain (18%)

- Structure of a Block
- Block Header
- Block Identifiers: Block header Hash and Block Height
- Linking Blocks in the Block Chain
- Merkle Trees and Simplified Payment Verification (SPV)

Mining (18%)

- Mining and Consensus
- Decentralized Consensus
- Aggregating transations into blocks
- Mining the Block
- Validating a new block
- Consensus attacks

Alternative Chains, Currencies and Applications (18%)

- Taxonomy of Currencies and Chains
- Meta Coin Platforms
- Noncurrency Alt Chains
- Future of Currencies

Security (10%)

- Security Principles
- Security Best Practices

12. METHODS OF INSTRUCTION (List methods used to present course content):

- Lecture
- Lab
- Discussion
- Critique
- Projects
- Multimedia Content
- Threaded Discussions

Other Methods:

13. ASSIGNMENTS

Out-of-class Assignments (List all assignments, including library assignments. Requires two (2) hours of independent work outside of class for each unit/weekly lecture hour. Outside assignments are not required for lab-only courses, although they can be given.)

Override Outside Class Hours: No

Outside-of-Class Hours (Min) 4.000

Outside-of-Class Hours (Max) 0.000

Override Outside-of-Class Hours (Min) 0.000

Override Outside-of-Class Hours (Max) 0.000

Out of class Assignment

1. Assigned text readings.
2. Install and configure a ledger-only Blockchain node
3. Create a digital wallet
4. Investigate exchange rates for several cryptocurrencies
5. Create an identity document on one or more blockchains
6. Programming assignments involving identity documents and smart claim.
7. Team programming projects.

14. STUDENT ASSESSMENT: (Grades are based on):

- ESSAY (Includes "blue book" exams and any written assignment of sufficient length and complexity to require students to select and organize ideas, to explain and support the ideas, and to demonstrate critical thinking skills.)
- COMPUTATION SKILLS

- NON-COMPUTATIONAL PROBLEM SOLVING (Critical thinking should be demonstrated by solving unfamiliar problems via various strategies.)
- MULTIPLE CHOICE
- OTHER (Describe)

OTHER (Describe):
Critique of case studies.

15. TEXTS, READINGS, AND MATERIALS

A. Textbooks:
YesNo37
Antonopoulos, Andreas M.. *Mastering Bitcoin*. 1 edition Sebastopol, CA, 2015.
Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder. *Bitcoin and Cryptocurrency Technologies*. 1 edition Princeton University Press, 2016.

Github - a web based repository with source code and documentation.
https://github.com/profcab/bitcoinbook.git

*Date is required: Transfer institutions require current publication date(s) within 5 years of outline addition/update.

B. Additional Resources:
Library/LRC Materials and Services:

The instructor, in consultation with a librarian, has reviewed the materials and services of the College Library/LRC in the subject areas related to the proposed new/updated course
Print Materials were reviewed? No

Non-Print Materials were reviewed? No

Online Materials were reviewed? No

Services were reviewed? No

Specific materials and/or services needed have been identified and discussed. Librarian comments:

C. Readings listed in A and B above are: (See definition of college level):
YesNo39
Primarily college level

16. DESIGNATE OCCUPATIONAL CODE:

C - Clearly Occupational

17. LEVEL BELOW TRANSFER:

Y - Not applicable

18. CALIFORNIA CLASSIFICATION CODE:

Y - Credit Course

19. NON CREDIT COURSE CATEGORY:

Y - Not Applicable, Credit course

20. FUNDING AGENCY CATEGORY:

Y - Not Applicable (funding not used to develop course)

REQUISITES AND ADVISORIES

RECOMMENDED PREPARATION:
CIS 005 Introduction to Computer Science or 006 Introduction to Computer Programming or CIS 007 Control Structures and Objects and MATH 230 Elementary and Intermediate Algebra for Business or STEM majors or 002 Precalculus with Analytic Geometry or MATH 013 Introduction to Statistics

STUDENT LEARNING OUTCOMES

1. **Select a cryptocurrency for their own use.**
   Written explanation of why they chose a platform and currency.
2. **Select a storage mechanism for their cryptocurrency**
   Creation of a wallet in one of the common forms
3. **Analyze a cryptocurrency transaction**
   Written explanation of transaction verification process.