

Course Syllabus

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Blockchain Technologies CPSC 459-01 Fall'21

Description & Objectives

Digital assets as a medium of exchange to secure financial transactions; decentralized and distributed ledgers that record verifiable transactions; smart contracts and Ethereum; Bitcoin mechanics and mining; the cryptocurrency ecosystem; blockchain mechanics and applications.

Prerequisites

CPSC 353 (Introduction to Computer Security); declared major/minor in CPSC, CPEN or CPEI.

Instructor

Professor: Wenlin Han

Email: whan@fullerton.edu

Office Hours: Live Zoom meetings via the scheduler appointments on **Canvas Calendar** or **email appointments**.

Meeting Information

This course is full online and semi self-paced.

This course will combine asynchronous instructions with synchronous instructions.

Asynchronous instructions combined with live Zoom meetings on demand to accommodate students with very diverse needs amid Covid-19 pandemic.

We will NOT have regular mandatory meetings (even for the first day of class).

Each module will open on Monday morning and close at Sunday night.

You'll have the whole week to learn and finish the module at your own pace.

Activities are listed on Canvas by dates. Be sure to click every link to see instructions and more details.

Live Zoom meetings are optional and available via Canvas calendar appointments or email appointments.

For Canvas Calendar appointment:

The following link shows you how to sign up for an appointment on Canvas

https://ursinus.instructure.com/courses/2839/pages/sign-up-for-an-appointment?module_item_id=81810

Take multiple slots consecutively if you need more time.

Reserve the same time slots if it is a group appointment.

For email appointment:

You can always email me at whan@fullerton.edu. If you need synchronous instructions or have any questions.

I'll setup one-on-one Zoom meeting appointment with you.

The time could be outside of class time, office hours and fit our schedules.

Important Dates

CSUF's Academic Calendar is posted online at «<http://apps.fullerton.edu/AcademicCalendar> />».

The Academic Calendar contains all the campus closures and holidays you should be aware of CSUF's Admissions Calendar is posted online at

«<http://www.fullerton.edu/admissions/Resources/Calendars.asp> ».

The Admissions Calendar contains all the major dates with respect to adding, dropping, and withdrawing from your classes.

Textbooks

The required textbook (draft version provided by the authors) is available on Canvas course page.

This course is a Zero-cost course and tagged with a ZCCM symbol.

- (Required) *Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction* by Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder, Princeton University Press, 1st Edition

- (Optional/Additional) *Mastering Bitcoin: Unlocking Digital Cryptocurrencies*, 1st Edition by Andreas Antonopoulos, O'Reilly Media

Learning Goals and Objectives

http://www.fullerton.edu/data/assessment/program_slos/ecs_bs_comsci.php

CLO1: Describe Blockchain technologies and its relationship with cryptocurrencies.

CLO2: Analyze cryptocurrency mechanics and protocols.

CLO3: Describe Blockchain decentralization and anonymity.

CLO4: Use basics of cryptography and crypto-economics.

CLO5: Identify real-world applications using cryptocurrency and Blockchain.

CLO6: Examine cryptocurrency politics and regulation.

CLO7: Construct a simple cryptocurrency.

CLO8: Construct alternative Blockchain mechanics and protocols.

Course Outline and Tentative Schedule

The tentative schedule may be subject to change.

Week 1 (08/23~08/29): Course overview and the latest Blockchain applications

Read syllabus (Mark as complete)

Meet your instructor and peers (0.5 pt)

Project 0 posted (Mark as complete, non-graded)

CLO 1

Week 2 (08/30~09/05): Chapter 1 - Intro to Crypto and Cryptocurrencies

Chapter 1 quiz (1 pt)

Discussion – First impression (0.5 pt)

CLO2, CLO7

Week 3 (09/06~09/12): Chapter 2 - How Bitcoin Achieves Decentralization

Chapter 2 quiz (1 pt)

Discussion – Consensus (0.5 pt)

Project 1 posted (10 pts)

CLO2, CLO3, CLO7

Week 4 (09/13~09/19): Chapter 3 - Mechanics of Bitcoin

Chapter 3 quiz (1 pt)

Extra work posted (for graduate students ONLY)

CLO2, CLO5

Week 5 (09/20~09/26): Chapter 4 - How to Store and Use Bitcoins

Chapter 4 Discussion (1 pt)

Midterm exam study guide posted

Project 1 due

CLO4, CLO5

Week 6 (09/27~10/03): Chapter 5 - Bitcoin Mining- part 1

Discussion – PoW and mining (0.5 pt)

CLO2, CLO4, CLO5

Week 7 (10/04~10/10): Chapter 5 - Bitcoin Mining- part 2

Chapter 5 quiz (1 pt)

Discussion – Reward and attack (0.5 pt)

Self-assessment handout 1 (non-graded)

CLO2, CLO4, CLO5

Week 8 (10/11~10/17): midterm review; Midterm exam (25pts, 10/14, open-book online)

Project 2 posted (10 pts)

Week 9 (10/18~10/24): Chapter 10 - Altcoins and the Cryptocurrency Ecosystem

Chapter 10 quiz (1 pt)**Coinbase quizzes (optional, non-graded, but you may earn >\$100 worth of cryptocurrencies)****CLO2, CLO4, CLO5, CLO8**

Week 10 (10/25~10/31): Chapter 6 - Bitcoin and Anonymity - part 1

Discussion – Anonymity (0.5 pt)**Project 2 due****CLO3, CLO5**

Week 11 (11/01~11/07): Chapter 6 - Bitcoin and Anonymity - part 2

Discussion – Darknet (0.5 pt)**Chapter 6 quiz (1 pt)****CLO3, CLO5**

Week 12 (11/08~11/14): Chapter 7 - Community, Politics, and Regulation

Project 3 posted (10pts)**Discussion – Regulation (0.5 pt)****Chapter 7 quiz (1 pt)****CLO4, CLO6**

Week 13 (11/15~11/21): Chapter 8 - Alternative Mining Puzzles

Chapter 8 quiz (1 pt)**Discussion – Alternative Mining (0.5 pt)****Final exam study guide posted****CLO2, CLO5, CLO8**Week 14 (11/22~11/28): Fall Recess - **NO CLASSES****CAMPUS OPEN 11/22-24****CAMPUS CLOSED 11/25-26**

Week 15 (11/29~12/05): Chapter 9 - Bitcoin as a platform

Chapter 9 quiz (1 pt)**Discussion – Bitcoin and Altcoin (0.5 pt)****Project 3 due****CLO2, CLO5, CLO8**

Week 16 (12/06~12/10): Final review and catch up

Extra work due (12/10, Friday)**Self-assessment handout 2 (non-graded)****Wave goodbye (optional, non-graded)****Last day of class:**

12/10/2021

Final exam (30 pts): Contact me to reschedule the final if you have a time conflict.

Online on Canvas

12/14/2021, Tuesday

1:00PM - 2:50PM

Grading

These cut-offs are strict. For example, 59.99999% is F.**The maximal grade for each grade item is 100% unless stated otherwise.**

A+: >= 97% A: >= 92% A-: >= 90%

B+: >= 87% B: >= 82% B-: >= 80%

C+: >= 77% C: >= 72% C-: >= 70%

D+: >= 67% D: >= 62% D-: >= 60%

F: < 60%

Category	% of Final Grade
Activities and participation	5%
Reading assignments and Quizzes	10%
Midterm exam	25%
Projects	30%
Final exam	30%

The instructor reserves the right to adjust the grading scale in student's favor according to the performance of the whole class. However, there will not be any exceptions for any individual students.

If there is a mistake in grading, please bring it to my attention immediately so it can be corrected. **Please note that grades are not negotiable.**

Students are strongly encouraged not to fall behind. The department policy discourages giving "incomplete" grade unless there are reasons beyond student's control.

According to the University policy on 400-level courses, graduate students are expected to complete additional work or perform better than undergraduate students.

Projects, Reading, Quizzes and Exam(s)

We will have reading assignments and quizzes for each chapter. We will have a midterm exam and a final exam. We will have 3-4 projects. Detailed information including total points and due dates will be provided and announced in class.

Extra Credit

Extra credit work is provided in projects for both undergraduate students and graduate students. Submittals must meet the same criteria as for mandatory work. Late extra credit submittals will not be accepted.

Extra Work

Graduate students are to fulfil additional work by writing a survey paper of any Blockchain topic or pick an open topic project.

Attendance Policy

Live attendance is NOT mandatory. Attendance will be recorded via class discussion and other activities.

Make Up Policy

Exams and quizzes cannot be taken after they have been given in class. Due to an act of nature, personal medical emergency, a family crisis, an act of terrorism, severe civil unrest, etc. students have **10 calendar days** to petition the instructor to retake any exam/quiz or submit an assignment without late penalty.

Exceptions shall be made on a case by case basis, provided there is time to evaluate the merits of such an application.

Participation

In the context of this course, participation is defined as the following:

- Taking notes.
- Actively listening to the lecture
- Annotating code listings and handouts.
- When needed/desired, seeking assistance to complete assignments.
- Respecting and treating the instructor and the student's peers civilly.

Required Material

- A writing instrument
- A notebook
- A personal computer with the requisite development tools or regular access to a computer lab (**Contact the instructor for long-term loaner's laptop checkout if you need one.**)

Academic Dishonesty

Students are encouraged to assist one another and discuss the course materials with your peers. It is your responsibility to be aware of and follow the spirit of CSU Fullerton's academic honesty policy which can be found at http://www.fullerton.edu/senate/publications_policies_resolutions/ups/UPS%20300/UPS%20300.021.pdf ». Academic dishonesty will not be tolerated. The University Catalog and the Class Schedule provide a detailed description of Academic Dishonesty under *University Regulations*.

By submitting work for evaluation, you acknowledge that you have adhered to the spirit of the university's academic honesty policy and that your submission is an original work by you unless otherwise directed to work in groups. Failure to follow the spirit of the academic honesty policy will result in a severely negative evaluation of the work in question and may result in involving the Department Chair and the Judicial Affairs office to seek a disciplinary remedy.

ADA Accommodations

Any student who, because of a disability, may require special arrangements in order to meet course requirements must register with the Office of Disability Support Services within the first week of classes. The Office of Disability Support Services' website is «<http://www.fullerton.edu/DSS/>». They can be reached by phone at 657-278-3117 or TDD at 657-278-2786. Their email address is «dsservices@fullerton.edu». Their office is located in University Hall, room 101. The instructor may request verification of need from the Dean of Students Office. Students requesting accommodations shall inform their instructors during the first week of classes about any disability or special needs that may require specific arrangements/accommodations related to attending class sessions, completing course assignments, writing papers or quizzes, tests or examinations.

Student Resources

Any student who wishes to discuss any concern may contact the assistant deans of the college. Assistant deans are student advocates who will help you navigate the university's policies and procedures and assist with resolving any conflicts.

Assistant Dean for Student Affairs Carlos Santana

CS-206A (657) 278-4407 «csantana@fullerton.edu»

Assistant Dean International Programs and Global Engagement Lillybeth Sasis

CS-206A (657) 278-4881 «lsasis@fullerton.edu»

Emergency Procedures

For your own safety and the safety of others, each student is expected to read and understand the guidelines published at «<http://prepare.fullerton.edu/campuspreparedness/>». Should an emergency occur, follow the instructions given to you by faculty, staff, and public safety officials. **Please call 911 for any and all emergencies.** An emergency information **recording** is available by calling the Campus Operation and Emergency Closure line at 657-278-4444.

Campus services

CAPS 24/7 crisis phone services for students: (657)278-3040

YOU@Fullerton: A free and confidential wellness portal that connects students to academic, physical and mental health resources. Student visit: <https://you.fullerton.edu>

CAPS appointments for students: (657) 278-3040 or visit <https://www.fullerton.edu/caps/>

Instructional Continuity

Due to an event such as an epidemic or a natural disaster that disrupts normal campus operations, students must monitor the course Canvas site and their campus email address for any instructions and assignments that the instructor announces.

Recording & Transcription of Class Content

Recording class content is governed by UPS 330.230, «http://www.fullerton.edu/senate/publications_policies_resolutions/ups/UPS%20300/UPS%20330.230.pdf». Each instructor must permit class content to be recorded or transcribed by students when mandated to do so by the Americans with Disabilities Act or by other federal or state laws. Any recording of class content is for private use and study and shall not be made publicly accessible without the written consent of the instructor and students in the class.

Course Rules & Classroom Management

Unless an agreement or accommodation is reached between the student and the instructor, these rules must be followed.

- The student is responsible to be aware of any course announcements including changes to due dates and requirements.
- Homework, programming assignments, etc. may not be submitted late.
- Third party work (code, artwork, etc.) may not be used in student work without prior instructor consent. Failure to gain and document instructor consent will be construed as willful academic dishonesty.
- When a third party's work is incorporated into student work after gaining instructor consent, failure to wholly document the work's origin, copyright and license will be construed as willful academic dishonesty.

Course Summary:

Date	Details	Due
Sun Aug 29, 2021	<u>Meet your peers</u>	due by 11:59pm
	<u>Read Syllabus</u>	due by 11:59pm
Sun Sep 5, 2021	<u>Chapter 1 quiz</u>	due by 11:59pm

Date	Details	Due
	<u>Discussion – First impression</u>	due by 11:59pm
	<u>Project 0 - Java tutorial</u>	due by 11:59pm
Sun Sep 12, 2021	<u>Chapter 2 quiz</u>	due by 11:59pm
	<u>Discussion – Decentralization and consensus</u>	due by 11:59pm
Sun Sep 19, 2021	<u>Chapter 3 quiz</u>	due by 11:59pm
Sun Sep 26, 2021	<u>Chapter 4 discussion</u>	due by 11:59pm
	<u>Project 1 - ScroogeCoin</u>	due by 11:59pm
Sun Oct 3, 2021	<u>Discussion – mining</u>	due by 11:59pm
Sun Oct 10, 2021	<u>Chapter 5 quiz</u>	due by 11:59pm
	<u>Discussion – mining pool attacks</u>	due by 11:59pm
Thu Oct 14, 2021	<u>Midterm exam</u>	due by 11:59pm
Sun Oct 24, 2021	<u>Chapter 10 quiz</u>	due by 11:59pm
Sun Oct 31, 2021	<u>Discussion – Anonymity</u>	due by 11:59pm
	<u>Project 2 - ConsensusFromTrust</u>	due by 11:59pm
Sun Nov 7, 2021	<u>Chapter 6 quiz</u>	due by 11:59pm
	<u>Discussion – Darknet</u>	due by 11:59pm
Sun Nov 14, 2021	<u>Chapter 7 quiz</u>	due by 11:59pm
	<u>Discussion - regulation</u>	due by 11:59pm
Sun Nov 21, 2021	<u>Chapter 8 quiz</u>	due by 11:59pm
	<u>Discussion – Alternative Mining</u>	due by 11:59pm
Sun Dec 5, 2021	<u>Chapter 9 quiz</u>	due by 11:59pm
	<u>Discussion - Blockchain lottery</u>	due by 11:59pm
	<u>Project 3 - Block chain</u>	due by 11:59pm
Fri Dec 10, 2021	<u>Extra work (for graduate students ONLY)</u>	due by 11:59pm
Tue Dec 14, 2021	<u>Final exam</u>	due by 2:50pm