Course Syllabus

CIS*6650 - Topics in Computer Science I: Blockchain Fundamentals and Applications F [0.50]
School of Computer Science, University of Guelph, Guelph
Fall Semester | 2021

1. INSTRUCTIONAL SUPPORT

Instructor Information

Instructor Name	Office	Phone	Email
Dr. Xiaodong Lin	Reynolds 2210	X53889	xlin08@uoguelph.ca
Office Hours: Thursday, 10:30 am - 12:00 pm or by appointment			

Lectures

Day	Time	Location
Wednesday	02:30PM - 05:20PM	REYN, Room 1101

Please note that the course is currently planned to happen in-person, but it may be moved online in response to Covid-19 restrictions; this is made with the health and well-being of everyone in mind during this unprecedented time. Any such changes will be announced via CourseLink and/or class email. All University-wide decisions will be posted on the COVID-19 website and circulated by email.

2. LEARNING RESOURCES

Textbook

There is no assigned textbook. All assigned readings and cases will be introduced in the class, and will be put on the course website on the **CourseLink**.

Course Website

Course material, news, announcements, and grades will be regularly posted to the CIS*6650 website which can be found on **Courselink**. It is the student's responsibility to check these pages frequently for new information or updates.

Course Description

Blockchain technology is quickly gaining popularity, and has been envisioned as a transformative technology for our society, from finance, to law, to logistics, to cybersecurity. It is a distributed

ledger, which constitutes a virtually unchangeable log of events and is maintained by several network nodes (e.g., the miners in Bitcoin). These nodes are mutual distrust while they can reach an agreement based on a consensus protocol, e,g., proof-of-work and proof-of-stake. In this course, we will study Blockchain fundamentals and applications built on top of them. The course covers various topics in Blockchain, including cryptographic techniques, consensus mechanisms, smart contracts, security and privacy, Decentralized Finance (DeFi) and economics, and applications of blockchains such as cryptocurrencies, logistics. It is primarily intended for students who want to conduct Blockchain research for their graduate studies and further the student's knowledge in research areas of relevance to Blockchain. It will consist of reading, reviewing, and presenting research papers. Students will gain insights into various topics and how research in Blockchain is conducted.

Prerequisites: You should be familiar with CS topics such as data structures and algorithms, operating systems, database systems, computer networks, distributed systems, cryptography, and some programming experience.
Also, an understanding of finance will be an asset.

4. COURSE TOPICS

Introduction to Blockchain technology
Bitcoin and cryptocurrency technologies
Consensus protocols
Cryptocurrency Transaction Analysis
Ethereum, smart contracts, and decentralized applications
Decentralized finance and economics
Security and Privacy on Blockchain
Applications and use cases of Blockchain technology

5. EVALUATION METHOD

Grading

In determining the overall grade of the course, the following weights will be used:

Coursework	Amount	% of Grade
Assignments	2	20
Reviews of papers	2	16
Discussion Participation		4
Course project	1	60 (Class presentation (8) + Project report (52))

The final grade is the weighted sum of all assessments shown above, using the weights indicated in the table above.

- Assignments: 20%

- There are 2 assignments, which are focused on specific tasks pertaining to blockchain. Each assignment is worth 10% of the total course grade:

  Assignment 1 =10% October 22nd
  Assignment 2 =10% November 18th

  Please note that the above schedule is tentative and may be subject to change, depending on class progress. If so, an announcement will be made on the Courselink accordingly.

- You can work on the assignments as a team of at most 2 people. Also, you are allowed to talk with other students currently enrolled in the course about the assignment content. We encourage you to use discussion boards on the CourseLink course website to help your peers. However, each team must complete their assignments and answer the questions completely independently.

- Paper reviews: 20%
  All students are to read, review or present research papers in order to understand the state of the art in blockchain research. Each student is assigned **TWO** articles selected from the proceedings of important conferences in the field (e.g., IEEE Symposium on Security and Privacy, ACM CCS, ACM ASIACCS, Usenix Security, Network and Distributed System Security Symposium (NDSS), Crypto, Eurocryp, Asiacrypt) and leading journals (e.g., IEEE Transactions on Information Forensics and Security, IEEE Transactions on Dependable and Secure Computing).

  You can choose either of the options below for your paper reviews

  - **Scholarly research critiques**: You will need to read the papers assigned critically so as to help you know more about some topic's background and as well develop your own idea. Afterwards, you will write two to three pages that reflect on what you learned and thought about each paper. The critique includes a short summary, but most of it will contain your original thoughts about the paper and what you learned.

    The following format is mandatory:

    - The document will be in 12-point font, single spaced.
    - Set the stage. Begin with no more than a quarter page that states the problem that the paper addressed, the solution, and the meaning.
    - State the strength(s) of the paper in one to three sentences.
    - State the weakness(es) or flaw(s) of the paper in one to three sentences.
    - The remainder of your critique will include three of the following:
      - How did it impact the field?
      - What questions remain open?
      - What experiments are missing?
      - How does it really relate to the previous research?

- Some examples for which it will or will not work.
- What impact did it have on the field?
- Ideas or thoughts it provoked.
- Do the authors overstate their contributions in the topic for the investigated research?
- Future research directions.
- Other interesting commentary.

Note that the strengths, weaknesses, and additional discussion should not just summarize what the paper did. They should present your own thoughts after having digested the material. It is very important to use evidence to support your own opinion. Also, it is not always necessary that you agree with everything the authors say in their published papers.

- **Paper presentations**: If you choose to present papers, you are allowed to select **two** research papers based on your research topic you are currently undertaking for your study or your knowledge and skills. You will present the paper to the class in a 30-minute conference-style presentation (Each presenter will have approximately 25 minutes to present the paper, plus 5 minutes for questions.). The student presenting the paper will then lead the class in a discussion of the paper, taking 40 minutes for the presentation and discussion in total for the paper. Note that a curated blockchain-related academic papers representing the recent advancements in the theme areas of blockchain can be found at the following link

  https://githubmemory.com/repo/btcu-pro/blockchain_conference_paper

  Note that if you choose to present papers, the submission deadlines for scholarly research critiques don't apply to you, but you will need to notify me of the title of the papers by the end of September 24th, 2021. So I will schedule your presentations accordingly. Also, you will need to send me your presentation via email.

- Discussion Participation: 4%
  - Particularly, discussion board participation. In the Discussion Board make meaningful posts or initiate discussion threads (at least **8** for the entire semester) to get full participation marks.

- Course Project – 60%: Students will work in pairs on either

  1) an original research project on some topic related to blockchain. Each pair will submit a proposal to the instructor no later than September 27th. Near the end of term, they will present their work to the class in a 30-minute (including five minutes for questions) conference-style presentation. In addition, by the end of term, they will produce a workshop-quality paper, describing their project. The paper length is **8** pages minimum in standard IEEE proceedings two-column format), including the abstract, tables, and figures (excluding references).

  Please note that the template for IEEE proceedings or all Transactions two-column format can be found in the following link

  http://www.ieee.org/web/publications/authors/transjnl/index.html

  Or, 2) they can choose to design and develop their own decentralized application (DApp) on blockchain (Ethereum). By the end of term, they will submit a report, describing their design and implementation as well as e the evaluation of some experiments of the proposed

DApp. The report length is **8** pages minimum in standard IEEE proceedings two-column format), including the abstract, tables, and figures (excluding references).

Note that you can work in a team of at most TWO people to complete the course project. Class presentation and/or demonstration if applicable is MANDATORY. Otherwise, you will receive no credit for the project. However, not all team members in one group must be present in their presentation.

Important Dates:

	Due Date	Grade percentage
Assignment 1	October 22nd	10%
Assignment 2	November 18th	10%
Scholarly research critique 1	October 1st	8%
Scholarly research critique 2	November 12th	8%
Course Project Presentation	TBD	8%
Course Project Report	December 3rd	52%

Disclaimer
Please note that the ongoing COVID-19 pandemic may necessitate a revision of the format of course offerings, changes in classroom protocols, and academic schedules. Any such changes will be announced via CourseLink and/or class email.

This includes on-campus scheduling during the semester, mid-terms and final examination schedules. All University-wide decisions will be posted on the COVID-19 website and circulated by email.

Illness
Medical notes will not normally be required for singular instances of academic consideration, although students may be required to provide supporting documentation for multiple missed assessments or when involving a large part of a course (e.g., final exam or major assignment).

For information on current safety protocols, follow these links:
https://news.uoguelph.ca/return-to-campuses/how-u-of-g-is-preparing-for-your-safe-return/
https://news.uoguelph.ca/return-to-campuses/spaces/#ClassroomSpaces

Please note, these guidelines may be updated as required in response to evolving University, Public Health or government directives.

Course Grading Policies
Late assignments: We will allow **3 total late days** ("grace days") for coursework (assignments, Scholarly research critiques, and project) **which you can use to give yourself extra time without penalty**. Please email me with your late submission if you decide to use these days for a particular assignment. Late days may be spread over any number of assignments at your own discretion, but the total number may not exceed 3. Late days are rounded up so that an assignment that is 28 hours late accumulated 2 late days. No extensions will be considered beyond the late days.

All assignments are due at 11:59 PM on the due date. Late assignments (and project report) beyond the grace days will incur a penalty of 25% in the first 24 hours, 50% in the second 24 hours, 75% in the third 24 hours, and 100% thereafter, unless prior arrangements are made or a valid reason presented within five days from the missed deadline. In no case will an assignment be accepted more than three days past the deadline; if a valid reason exists for being unable to hand in an assignment within five days following the deadline, then the assignment will be assigned a weight of zero and the weight of the missing assignment will be moved to your course project.
If you are prevented from completing your project due to medical or personal reasons you are advised to contact the instructor earlier so the proper arrangements can be made and an INC grade may be assigned.

Submission policy: All your course work will be only be accepted via submission through CourseLink unless otherwise indicated on the assignment by the instructor. Failure to submit assignments correctly (e.g., wrong files, etc.) will result in a zero mark.

Regrades: Students may request a reassessment of their assignments in writing and specify the reasons for such requests. Their entire assignment will be reassessed, and the reassessment may result in raising or lowering of the original marks. Remark requests will only be accepted up to **5 calendar days** from the release of the assignment mark. Please carefully read through the comments made by the marker on CourseLink before sending a remark request.

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please contact your course instructor within five days following the deadline. Please see below for specific details and consult the graduate calendar for information on regulations and procedures for Academic Consideration: https://www.uoguelph.ca/registrar/calendars/graduate/2020-2021/

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the instructor within two weeks of the start of the semester to make alternate arrangements. See the graduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:
https://www.uoguelph.ca/registrar/calendars/graduate/2020-2021/

Plagiarism Policy: All work submitted must be your own. Similarities between assignment submissions are monitored using Turnitin as well as by manual means.

Special Note:

• A reliable internet connection that is sufficient for online learning is necessary for this course. If you do not have a sufficiently fast and reliable internet connection then you may not be able to view or download lectures or other course material. It may also not be possible to attend online advising with teaching assistants or the instructor.
• This course is offered in the eastern standard time zone (EST). While taking this course then you may be required to attend online activities such as advising times or labs between 9:00 and 5:20 EST.

• Keep copies of assignments which you have submitted. You may be asked to resubmit assignments at a later time.
• All cases of academic misconduct are handled by the Dean, in conjunction with the School Director. Successive infractions of misconduct affirmed by this process could have consequences as serious as expulsion from the University. For details please see related pages in the University of Guelph Graduate Calendar 2021-2022.
• Requests for academic consideration because of illness or of a compassionate nature must be made in writing.

6. STANDARD STATEMENTS

The following are standard statements for inclusion on all course outlines (adapted with permission from the College of Arts). Some departments or colleges may also elect to post this information on a common website and link to such sites in the course outline. However, it is strongly recommended that statements on academic misconduct and links to the academic misconduct section of the academic calendars are included on all course outlines.

E-mail Communication
As per university regulations, all students are required to check their <mail.uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its students.

When You Cannot Meet a Course Requirement
When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons, please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. See the undergraduate calendar for information on regulations and procedures for Academic Consideration.

Drop Date
Students will have until the last day of classes to drop courses without academic penalty. The regulations and procedures for course registration are available in their respective Academic Calendars.

Copies of out-of-class assignments
Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

Accessibility
The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required, however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance, and not later than the 40th Class Day. More information: www.uoguelph.ca/sas

Academic Misconduct

The University of Guelph is committed to upholding the highest standards of academic integrity and it is the responsibility of all members of the University community – faculty, staff, and students – to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff and students have the responsibility of supporting an environment that discourages misconduct. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it.

Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

The Academic Misconduct Policy is detailed in the Graduate Calendar.

Recording of Materials

Presentations which are made in relation to course work—including lectures—cannot be recorded or copied without the permission of the presenter, whether the instructor, a classmate or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies and regulations which apply to undergraduate, graduate and diploma programs.