USC Marshall
School of Business

FBE 499
Introduction to Decentralized Finance – DeFi
Fall 2024
2.0 units – The class meets 1.50 twice a week for 8 weeks

FACULTY AND CONTACT INFORMATION

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Class hours:	TBD
Classroom:	TBD
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COURSE DESCRIPTION

Decentralized finance or DeFi is a new trend in finance that could reshape the structure of the finance industry in a fundamental way. DeFi is part of the broader FinTech evolution which is made possible by the application of new technologies. The market structure and functioning of DeFi are fundamentally different from traditional finance and part of the FinTech industry. In traditional finance and some of today's FinTech, financial services are provided by identifiable companies, whether traditional banks or Fintech companies, that establish direct relationships with their customers. Companies collect a variety of information from customers and, typically, do not share information with their competitors. By contrast, in DeFi, information is publicly accessible to all operators while still maintaining anonymity of the operators. Everybody can participate in the marketplace either as a user (customer) or as a provider (supplier of services). But there is no direct relationship between customers and providers. Importantly, each provider has limited control over the system, unlike in the typical marketplace for finance.

The course will begin with a brief introduction and overview of the technical architecture of decentralized finance. Having a clear idea of the technical architecture is essential for understanding (and appreciate) the importance and implications of DeFi for the functioning of financial markets. An important component of the course is the economic and financial analysis of currencies and assets created in DeFi, with special attention to cryptocurrencies and non-fungible tokens. Some of the financial analysis of cryptocurrencies and non-fungible tokens will be conducted in Python. We will make use of Python because is widely used in the finance industry and is an essential tool for quantitative analyses.

Decentralized finance is not only about cryptocurrencies and non-fungible tokens. Many other financial transactions and financial services are implemented in DeFi through smart contracts. They include borrowing and lending, financial derivatives, exchanges, etc. These transactions and financial services will be also analyzed in this course.

LEARNING OBJECTIVES

Upon successful completion of this course, students will be able to:

1. Describe the basic architecture of DeFi.
2. Explain how DeFi affects competition in financial markets.
3. Describe the problems associated with traditional finance and whether DeFi could solve or alleviate these problems.
4. Evaluate whether cryptocurrencies have the potential to become dominant as means of transaction (money).
5. Explain how smart contracts can be used to implement financial services.
6. Describe the typical pattern of an asset price bubble and whether some segments of the DeFi market display signs of this pattern.

COURSE MATERIALS

- **Books**: Eswar S. Prasad, *The Future of Money*, 2021, Harward University Press.
  Campbell R. Harvey, Ashwin Ramachandran and Joey Santoro, *DeFi and The Future of Finance*, 2021, Wiley.
  Baxter Hines, *Digital Finance*, 2021, Wiley.
  Hands-On Python for Finance, 2019, Packt.
  Boom and Bust: A Global History of Financial Bubbles, William Quinn and John D. Turner, 2020, Cambridge University Press.
- **Slides**: Slides for the topic covered in each class will be posted in Brightspace before the class meets. The slides synthesize the most important topics covered in the above listed books. Complemented with class attendance, the slides will provide sufficient material to learn the content of the class. However, if students find the coverage in the slides insufficient, they can use the listed books as helpful complements. This explains why the listed books are not mandatory.
- **Python programs**: Python programs will be constructed together in class. Students do not need a prior knowledge of Python. Basic knowledge of programming, in any language, would be helpful but not essential. We will use Python for the analysis of financial data. For that purpose, we will use "yfinance" which is a python package that enables us to fetch historical market data from Yahoo Finance API.
- **Additional readings**: I will recommend additional (short) readings that will be posted in Brightspace at least one week before they are due. The readings are based on the most recent events related to the course that happen while the class is in session. Typically, they are news articles.

PREREQUISITES AND/OR PREPARATION

There are no prerequisites for this class. What will be useful in preparation for the course is to follow current news about cryptocurrencies, digital assets, and more generally decentralized finance. Without previous knowledge of these concepts will be difficult to fully understand the related news. Still, it will be useful to have a sense of what you would like to understand during the course by reading related news. One of the goals of the course is to explain the concepts covered in the news and illustrate why they are relevant for financial markets.

CLASS FORMAT

This is a residential class, and in-person attendance is expected. There is no option to attend class via Zoom.

COURSE NOTES

Slides and supplementary readings will be posted on Brightspace ahead of the relevant class. For class meetings in which we perform applications in Pythons, I recommend students to bring their personal laptop so that they can replicate interactively what shown in class. Python programs developed during class will be made available in Brightspace after the class.

GRADING POLICY

The course grade will be based on the following weighted requirements:

1. A set of 5 homework assignments **30%**
2. Group presentation **20%**
3. Final Exam **40%**
4. Class participation **10%**

Class participation: Class participation is an important part of the learning process as the richness of the experience will be largely dependent upon the degree of preparation by *all* students prior to each class session.

Homework: There will be five homework assignments that must be submitted individually in Brightspace.

- The first two assignments consist of questions aimed at verifying students' comprehension of the material covered in the first two weeks.
- In the third and fourth assignments students conduct quantitative exercises using historical trading data for cryptocurrencies by writing their own Python code.
- The fifth assignment consists of mostly numerical questions aimed at verifying student understanding of financial operations that can be performed in various DeFi platforms such as Compound, MakerDAO, etc.

Students are permitted to discuss with other students their ideas for completing the homework. However, once the student begins writing the deliverable, all work must be individual and independent. Deadline extensions will be granted if there is a valid motivation. The student, however, should request the extension before the deadline expires. Late submissions that are not justified will receive zero credits.

Group Presentation: A group can have a maximum of three or four students, depending on the size of the class. Students are encouraged to form their own group. Those who are unable to form their own group will be assigned to a group by the instructor. The presentation will be based on the development of an idea that could potentially be launched in decentralized finance. It will propose financial transactions/services that could be implemented with smart contracts and provides an analysis of its market potential. Grades for individual contributions to group projects are assigned by the instructor based on the observation of the team's working dynamics, the assessment of the team's project quality, and thoughtful consideration of the information provided through peer evaluations (see attached peer-evaluation form in the appendix). Peer evaluations will be used to assess individual participation in producing the deliverables. The deliverable consists of the slides prepared for the presentation, in addition to the actual presentation. They should be submitted the day before the in-class presentation, by midnight. It is sufficient that one of the group members submits the slides. Late submissions will receive a 2 percent penalty (out of the maximum of 20 percent credit for the presentation).

Makeup Exams: Makeup for a missing exam is allowed only for unavoidable circumstances that need to be properly documented in advance of the exam date.

Final grades represent how individual students perform in the class relative to other students. The average grade for this class is expected to average about 3.5. Three items are considered when assigning final grades:

1. Your average weighted score as a percentage of the available points for all assignments (the points you receive divided by the number of points possible).
2. The overall average percentage score within the class.
3. Your ranking among all students in the class.

COLLABORATION POLICY

Students are permitted and encouraged to discuss with others their ideas for completing assignments. However, once a student begins writing the deliverable, all work must be individual and independent. The only exception, of course, is the group project where the deliverable can be written in collaboration with the members of the group (but not members of other groups).

Students may not seek help from anyone outside the class, including but not limited to former students of this course, friends and family, tutors, and online forums. Students may consult course materials and web resources. Students may not post anything related to the assignments online.

SUBMISSION POLICY

Assignments must be turned in on the due date/time electronically via Brightspace. If for some reason you encounter difficulties submitting it through Brightspace, you must deliver it as an attachment by email by the due date. If there are circumstances that impair your ability to submit the assignment on time (for example for health reasons), you should communicate it to the instructor before the due date. If you have a reasonable reason to ask for an extension, the extension will be granted. It is important, however, to request the extension (for example by email) before the deadline. If communicated after the deadline, the student will not receive any credit for the assignment.

COURSE OUTLINE AND ASSIGNMENTS

	Topics/ Daily Activities	**Readings**	**Deliverables**
Week 1 (Lecture 1)	Intro to decentralized finance (DeFi). What are the main differences between DeFi and traditional finance?	Slides posted on Brightspace for the week. *DeFi and The Future of Finance*, Wiley: Chapters 1 and 5. *Digital Finance*, Wiley: Introduction.	
Week 1 (Lecture 2)	The architecture of DeFi: Blockchains as platforms for financial applications.	*Digital Finance*, Wiley: Chapter 1. *The Future of Money*, Harvard University Press: Chapter 4.	
Week 2 (Lecture 1)	Continue with the architecture of DeFi: Blockchains as platforms for financial applications.	Slides posted on Brightspace for the week. *Digital Finance*, Wiley: Chapter 1. *The Future of Money*, Harvard University Press: Chapter 4.	

Week 2 (Lecture 2)	The functions of money, the role of cryptocurrencies in the monetary system, and stablecoins.	*The Future of Money*, Harvard University Press: Chapters 2 and 6.	Homework 1 **Due date**: Friday of week 2 by midnight.
Week 3 (Lecture 1)	Introduction to Python for finance.	Slides posted on Brightspace for the week. *Hands-On Python for Finance*, Packt: Chapter 1	
Week 3 (Lecture 2)	Using Python for financial analysis.	*Hands-On Python for Finance*, Packt: Chapter 2	Homework 2 **Due date**: Friday of week 3 by midnight
Week 4 (Lecture 1)	Cryptocurrencies as an investment vehicle: analysis of risk-return trade-off.	Slides posted on Brightspace for the week.	
Week 4 (Lecture 2)	Analysis of risk-return trade-off with Python.		Homework 3 **Due date**: Friday of week 4 by midnight
Week 5 (Lecture 1)	Decentralized borrowing and lending.	Slides posted on Brightspace for the week. *DeFi and The Future of Finance*, Wiley: Chapter 6.	
Week 5 (Lecture 2)	Decentralized exchanges.	*DeFi and The Future of Finance*, Wiley: Chapter 6.	Homework 4 **Due date**: Friday of week 5 by midnight
Week 6 (Lecture 1)	Derivatives and tokenization.		

		Slides posted on Brightspace for the week. *DeFi and The Future of Finance,* Wiley: Chapter 6.	
Week 6 (Lecture 2)	Non fungible tokens (NFTs) and the anatomy of an asset price bubble. Do markets for cryptocurrencies and NFTs display potential signs of bubbles?	*Digital Finance*, Wiley, Chapter 2,3, 4 and 9. *Boom and Bust: A Global History of Financial Bubbles,* Cambridge University Press: Chapters 1-2 and 12.	Homework 5 **Due date**: Friday of week 6 by midnight
Week 7 (Lecture 1 & 2)	Group presentations		
Week 8	**Final exam per USC Final Exam Schedule if the class is scheduled in the seond half of the semester, or during the second scheduled meeting of week 8 if the class is scheduled in the first half of the semester.**		

ADDITIONAL INFORMATION

Technology Policy: Laptop and Internet usage is necessary for this course. However, during class, laptops should be used only for the purpose of the class. When a laptop is not needed in class it should be turned off. The use of other personal communication devices during academic or professional sessions is considered unprofessional and is not permitted. ANY e-devices, other than the one being used for class activities (cell phones, iPads, laptops, etc.), must be completely turned off during class time. Use of any recorded or distributed material is reserved exclusively for the USC students registered in this class. Exceptions to this policy may be granted to individual students with appropriate documentation on a case-by-case basis.

Artificial Intelligence (AI) policy

While it is not always advisable to utilize AI in this course, if you find it beneficial for achieving the learning objectives, you can employ AI-powered programs to assist you with assignments. One of the primary aims of the assignments is to grasp the course material thoroughly and prepare for the exams. However, if you rely on AI to answer assignment questions, you might not

adequately prepare for the exams, as AI won't be accessible during in-class examinations. Additionally, it's important to recognize that AI tools may provide incorrect information, biased responses, or incomplete analyses. Consequently, they are not yet capable of generating text or solutions that meet the standards set for this course. In alignment with our university's values, it is essential to cite any AI-generated materials (such as text, images, etc.) incorporated or referenced in your work and provide the prompts used to generate the content.

Open Expression and Respect for All: An important goal of the educational experience at USC Marshall is to be exposed to and discuss diverse, thought-provoking, and sometimes controversial ideas that challenge one's beliefs. In this course we will support the values articulated in the USC Marshall "Open Expression Statement."

Statement on Academic Conduct and Support Systems

Academic Integrity:
The University of Southern California is a learning community committed to developing successful scholars and researchers dedicated to the pursuit of knowledge and the dissemination of ideas. Academic misconduct, which includes any act of dishonesty in the production or submission of academic work, compromises the integrity of the person who commits the act and can impugn the perceived integrity of the entire university community. It stands in opposition to the university's mission to research, educate, and contribute productively to our community and the world.

All students are expected to submit assignments that represent their own original work, and that have been prepared specifically for the course or section for which they have been submitted. You may not submit work written by others or "recycle" work prepared for other courses without obtaining written permission from the instructor(s).

Other violations of academic integrity include, but are not limited to, cheating, plagiarism, fabrication (e.g., falsifying data), collusion, knowingly assisting others in acts of academic dishonesty, and any act that gains or is intended to gain an unfair academic advantage.

The impact of academic dishonesty is far-reaching and is considered a serious offense against the university. All incidences of academic misconduct will be reported to the Office of Academic Integrity and could result in outcomes such as failure on the assignment, failure in the course, suspension, or even expulsion from the university.

For more information about academic integrity see the student handbook or the Office of Academic Integrity's website, and university policies on Research and Scholarship Misconduct.

Please ask your instructor if you are unsure what constitutes unauthorized assistance on an exam or assignment, or what information requires citation and/or attribution.

Students and Disability Accommodations:

USC welcomes students with disabilities into all of the University's educational programs. The Office of Student Accessibility Services (OSAS) is responsible for the determination of appropriate accommodations for students who encounter disability-related barriers. Once a student has completed the OSAS process (registration, initial appointment, and submitted documentation) and accommodations are determined to be reasonable and appropriate, a Letter of Accommodation (LOA) will be available to generate for each course. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at osas.usc.edu. You may contact OSAS at (213) 740-0776 or via email at osasfrontdesk@usc.edu.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

988 Suicide and Crisis Lifeline - 988 for both calls and text messages – 24/7 on call
The 988 Suicide and Crisis Lifeline (formerly known as the National Suicide Prevention Lifeline) provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week, across the United States. The Lifeline is comprised of a national network of over 200 local crisis centers, combining custom local care and resources with national standards and best practices. The new, shorter phone number makes it easier for people to remember and access mental health crisis services (though the previous 1 (800) 273-8255 number will continue to function indefinitely) and represents a continued commitment to those in crisis.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL) – 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender- and power-based harm (including sexual assault, intimate partner violence, and stalking).

Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086
Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
Avenue to report incidents of bias, hate crimes, and microaggressions to the Office for Equity, Equal Opportunity, and Title for appropriate investigation, supportive measures, and response.

The Office of Student Accessibility Services (OSAS) - (213) 740-0776
OSAS ensures equal access for students with disabilities through providing academic accommodations and auxiliary aids in accordance with federal laws and university policy.

USC Campus Support and Intervention - (213) 740-0411
Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity, Equity and Inclusion - (213) 740-2101
Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call
Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-1200 – 24/7 on call
Non-emergency assistance or information.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your concern.

Occupational Therapy Faculty Practice - (323) 442-2850 or otfp@med.usc.edu
Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.

Revised 07/2023; emergency web site moved 12/18/23

Participation Statement

Participation. In-class participation is 10% of the total grade and evaluated based on your level of involvement in class discussions and in-class exercises.

> One of the primary goals of this course is to help you develop the ability both to clarify your own position on an issue and to be able to articulate and defend it clearly. Sharing your perceptions and ideas with others is crucial for learning and for understanding how the diverse opinions that you are likely to encounter in an organization are debated. You will find yourself presenting and testing new ideas that are not wholly formulated and assisting others in shaping their ideas as well. You should be prepared to take some risks and be supportive of the efforts of others.

Effective class participation consists of analyzing, commenting, questioning, discussing, and building on others' contributions; it is not repeating facts or monopolizing class time. The ability to present one's ideas concisely and persuasively and to respond effectively to the ideas of others is a key business skill. One of the goals of this course is to help you sharpen that ability.

Outstanding Contribution: Your contributions reflect considerable preparation; they are substantive and supported by evidence from the case, readings, and logic. Your comments or questions create a springboard for discussion by making a critical insight. You synthesize and build upon what has already been said in the discussion. The class learns from you when you speak; in your absence, the discussions would suffer.

Good Contribution. You come prepared with substantiated comments. You demonstrate good insight and clear thinking. You are able to make some connection to what has been said in prior discussion. The class notices when you're not part of the discussion.

Minimal Contribution. You participate but are unprepared. You rarely offer interesting insights into the discussion. It appears that you are not listening to what others are saying during discussion.

No Contribution. You say little or nothing in class. If you were not in the class, the discussion would not suffer.

PEER EVALUATION FORM

Please identify your team and team members for the ____ Project(s) that you worked on. Then rate all of your team members, *including yourself,* based on the contributions of each team member for the selected assignment according to the criteria listed below. On a scale of 0 – 2 with 0 equal to does not meet expectations, 1 meets expectations and 2 exceeds expectations, rate each person on each of the five criteria. Last, add up the points for each person with the maximum number of points for each person being 10.

Team Members/ Assessment Criteria of Team Contributions	Team Member 1	Team Member 2	Team Member 3	Yourself
1. Role Performance				
2. Assists Team Members				
3. Listening and Discussing				
4. Research and Information Sharing				
5. Time Management				
Total				

Comments: