



## **FBE 499**

**Introduction to Decentralized Finance – DeFi**

**Fall 2022**

**2.0 units – The class meets once a week on Tuesday at 10:00-11:50AM**

---

### **FACULTY AND CONTACT INFORMATION**

Professor:	Vincenzo Quadrini
Office:	HOH 715
Phone:	213-740-6521
E-mail:	quadrini@usc.edu
Class hours:	Tuesday, 10:00-11:50AM
Classroom:	JFF 328
Office hours:	Tuesday 2:30-4:30PM

### **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 technological advances. 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 costumers. 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. The financial analysis of cryptocurrencies and non-fungible tokens will be conducted in Python. We will use 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 studied 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.

### REQUIRED MATERIALS

- **Books:** Eswar S. Prasad, *The Future of Money*, 2021, Harvard 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 Blackboard before the class meets.
- **Python programs:** 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:** Occasionally, I might recommend additional (short) readings. They will be posted in Blackboard at least one week before they are due.

### 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. One of the goals of the course is to explain these concepts and illustrate why they are relevant and receive so much coverage in the news.

## CLASS FORMAT

This is a residential class and in-person attendance is expected. Unless students provide an accommodation letter from USC OSAS requiring remote attendance, there is no option to attend class via Zoom.

## COURSE NOTES

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

## GRADING POLICY

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

- |   |            |
|---|------------|
| 1. A set of 5 homework assignments (each counting 5%) | <b>25%</b> |
| 2. Group project                                      | <b>20%</b> |
| 3. Midterm exam                                       | <b>25%</b> |
| 4. Final Exam   | <b>25%</b> |
| 5. Class participation                                | <b>5%</b>  |

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.

Group Project: A group can have a maximum of four students. 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. 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).

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 Blackboard. If for some reason you encounter difficulties submitting it through Blackboard, 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, you will not receive any credit for the assignment.

## COURSE OUTLINE AND ASSIGNMENTS

	<b>Topics/ Daily Activities</b>	<b>Readings</b>	<b>Deliverables</b>
<i>Week 1</i> (August 23)	<p>Intro to decentralized finance (DeFi).</p> <p>What are the main differences between DeFi and traditional finance?</p>	<p><i>DeFi and The Future of Finance</i>, Wiley: Chapters 1 and 5.</p> <p><i>Digital Finance</i>, Wiley: Introduction.</p>	
<i>Week 2</i> (August 30)	<p>The architecture of DeFi: Blockchains as platforms for financial applications.</p>	<p><i>Digital Finance</i>, Wiley: Chapter 1.</p> <p><i>The Future of Money</i>, Harvard University Press: Chapter 4.</p>	
<i>Week 3</i> (September 6)	<p>The functions of money and the role of cryptocurrencies in the monetary system.</p>	<p><i>The Future of Money</i>, Harvard University Press: Chapter 2.</p>	Homework 1
<i>Week 4</i> (September 13)	<p>Digital currencies as national currencies.</p>	<p><i>The Future of Money</i>, Harvard University Press: Chapter 6.</p>	
<i>Week 5</i> (September 20)	<p>Introduction to Python for finance.</p>	<p><i>Hands-On Python for Finance</i>, Packt: Chapter 1</p>	Homework 2
<i>Week 6</i> (September 27)	<p>Using Python for financial analysis.</p>	<p><i>Hands-On Python for Finance</i>, Packt: Chapter 2</p>	

<i>Week 7</i> (October 4)	Cryptocurrencies as an investment vehicle: analysis of risk-return trade-off.	Material provided in Blackboard	Homework 3
<i>Week 8</i> (October 11)	<b>Midterm exam</b>		
<i>Week 9</i> (October 18)	Financial transactions through smart contracts.	<i>DeFi and The Future of Finance</i> , Wiley: Chapter 6.	
<i>Week 10</i> (October 25)	Decentralized borrowing and lending.	<i>DeFi and The Future of Finance</i> , Wiley: Chapter 6.	
<i>Week 11</i> (November 1)	Non fungible tokens (NFTs): Will NFTs revolutionize the market for artistic production?	<i>Digital Finance</i> , Wiley, Chapter 4.  <i>Digital Finance</i> , Wiley: Chapter 2-3 and 9.	Homework 4
<i>Week 12</i> (November 8)	The anatomy of an asset price bubble.  Do markets for cryptocurrencies and NFTs display potential signs of bubbles?	<i>Boom and Bust: A Global History of Financial Bubbles</i> , Cambridge University Press: Chapters 1-2 and 12.	
<i>Week 13</i> (November 15)	Regulating the market for digital assets.	<i>Digital Finance</i> , Wiley, Chapter 7.	Homework 5
<i>Week 14</i> (November 22)	Group presentations		
<i>Week 15</i> (November 29)	Group presentations		

## ADDITIONAL INFORMATION

**Add/Drop Process:** Most Marshall classes are open enrollment (R-clearance) through the Add deadline. If there is an open seat, you can add the class using Web Registration. If the class is full, you will need to continue checking Web Registration or the *Schedule of Classes* ([classes.usc.edu](http://classes.usc.edu)) to see if a space becomes available. Students who do not attend the first class meeting may be dropped from the course. There are no formal wait lists for Marshall undergraduate courses, and professors cannot add students or increase the course capacity. If all sections of the course are full, you can add your name to an interest list by contacting the Office of Undergraduate Advising & Student Affairs; if new seats or sections are added, students on the interest list will be notified.

The last day to withdraw without receiving a “W” (and receive a refund) is Friday, September 9, 2022. The last day to drop with a mark of a “W” (no refund) is Friday, November 11, 2022.

**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. 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.

**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](#).”

## USC Statement on Academic Conduct and Support Systems

**Academic Conduct:** Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” [policy.usc.edu/scampus-part-b](http://policy.usc.edu/scampus-part-b). Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on [Research and Scholarship Misconduct](#).

**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](http://osas.usc.edu). You may contact OSAS at (213) 740-0776 or via email at [osasfrontdesk@usc.edu](mailto:osasfrontdesk@usc.edu).

## **Support Systems:**

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*  
[studenthealth.usc.edu/counseling](http://studenthealth.usc.edu/counseling)

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

*National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call*  
[suicidepreventionlifeline.org](http://suicidepreventionlifeline.org)

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call*

[studenthealth.usc.edu/sexual-assault](http://studenthealth.usc.edu/sexual-assault)

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

*Office for Equity, Equal Opportunity, and Title IX (EEO-TIX) - (213) 740-5086*  
[eotix.usc.edu](http://eotix.usc.edu)

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*  
[usc-advocate.symplicity.com/care\\_report](http://usc-advocate.symplicity.com/care_report)

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.usc.edu](http://osas.usc.edu)

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) 821-4710*  
[campussupport.usc.edu](http://campussupport.usc.edu)

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*  
[diversity.usc.edu](http://diversity.usc.edu)

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*  
[dps.usc.edu](http://dps.usc.edu), [emergency.usc.edu](http://emergency.usc.edu)

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) 442-120 – 24/7 on call*  
[dps.usc.edu](http://dps.usc.edu)

Non-emergency assistance or information.

*Office of the Ombuds* - (213) 821-9556 (UPC) / (323-442-0382 (HSC)

[ombuds.usc.edu](http://ombuds.usc.edu)

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) 442-3340 or [otfp@med.usc.edu](mailto:otfp@med.usc.edu)

[chan.usc.edu/otfp](http://chan.usc.edu/otfp)

Confidential Lifestyle Redesign services for USC students to support health promoting habits and routines that enhance quality of life and academic performance.

**Appendix I**  
**Marshall Undergraduate Program Learning Goals and Objectives**

Goal	Marshall Program Learning Goal Description Covered in this Course	Emphasis/Relation to Course Objectives	Relevant Course Topics/Assignments
1	<p><b>Our graduates will demonstrate critical thinking skills so as to become future-oriented problem solvers, innovators and decision makers in diverse and rapidly changing business environments.</b></p> <ul style="list-style-type: none"> <li>• Students will demonstrate the ability to anticipate, identify and solve business problems. They will be able to identify and assess central problems, identify and evaluate potential solutions, and translate a chosen solution to an implementation plan that considers future contingencies</li> <li>• Students will demonstrate the ability to be accurate, clear, expansive (thorough, detailed) and fair-minded in their thinking</li> <li>• Students will critically analyze concepts, theories and processes by stating them in their own words, understanding key components, identifying assumptions, indicating how they are similar to and different from others and translating them to the real world</li> <li>• Students will be effective at gathering, storing, and using qualitative and quantitative data and at using analytical tools and frameworks to understand and solve business problems</li> <li>• Students will understand the concepts of critical thinking, entrepreneurial thinking and creative thinking as drivers of innovative ideas</li> </ul>	<b>High</b>	<p>The whole course is aimed at understanding and analyzing the most innovative section of the financial market. Students must use critical thinking to make conclusions about the viability of the most innovative market in the finance industry. They will also develop critical thinking strategies that would drive individual decisions such as investing in cryptocurrencies and non-fungible tokens.</p>
2	<p><b>Our graduates will develop people and leadership skills to promote their effectiveness as business managers and leaders in the 21<sup>st</sup> century's evolving work and organizational structures.</b></p> <ul style="list-style-type: none"> <li>• Students will recognize, understand and analyze the roles, responsibilities and behaviors of effective managers and leaders in diverse business contexts e.g., functionally diverse, culturally diverse, geographically diverse, etc.</li> <li>• Students will understand factors that contribute to effective teamwork including how to elicit, manage and leverage diverse perspectives and competencies.</li> <li>• Students will recognize, understand, and analyze the motivations and behaviors of stakeholders inside and outside organizations (e.g., teams, departments, consumers, investors, auditors)</li> </ul>	<b>Moderate</b>	<p>Knowledge about the market in which a business operates is important, of course, to perform effective leadership. But the course is not specifically designed to develop managerial skills.</p>

3	<p><b>Our graduates will be effective communicators to facilitate information flow in organizational, social, and intercultural contexts.</b></p> <ul style="list-style-type: none"> <li>• Students will identify and assess diverse personal and organizational communication goals and audience information needs</li> <li>• Students will demonstrate an ability to gather and disseminate information and communicate it clearly, logically, and persuasively in professional contexts</li> <li>• Students will understand individual and group communications patterns and dynamics in organizations and other professional contexts</li> </ul>	Moderate	<p>Effective communication also requires knowledge of the communicated subject. Furthermore, quantitative measures that can provide a more effective and precise idea about the communicated message are also important. In this sense the course contributes somewhat to this goal. However, communication is not the main goal of the course.</p>
4	<p><b>Our graduates will demonstrate ethical reasoning skills, understand social, civic, and professional responsibilities and aspire to add value to society.</b></p> <ul style="list-style-type: none"> <li>• Students will recognize ethical challenges in business situations and assess appropriate courses of action</li> <li>• Students will understand professional codes of conduct</li> </ul>	NA	<p>Not explicitly covered in this course</p>
5	<p><b>Our graduates will develop a global business perspective. They will understand how local, regional, and international markets, and economic, social and cultural issues impact business decisions so as to anticipate new opportunities in any marketplace.</b></p> <ul style="list-style-type: none"> <li>• Students will understand that stakeholders, stakeholder interests, business environments (legal, regulatory, competitor) and business practices vary across regions of the world</li> <li>• Students will understand how local, regional and global markets interact and are impacted by economic, social and cultural factors.</li> </ul>	NA	<p>Not explicitly covered in this course</p>
6	<p><b>Our graduates will understand types of markets and key business areas and their interaction to effectively manage different types of enterprises.</b></p> <ul style="list-style-type: none"> <li>• Students will demonstrate foundational knowledge of core business disciplines, including business analytics and business economics</li> <li>• Students will understand the interrelationships between functional areas of business so as to develop a general perspective on business management</li> <li>• Students will apply theories, models, and frameworks to analyze relevant markets (e.g. product, capital, commodity, factor and labor markets)</li> <li>• Students will be able to use technologies (e.g., spreadsheets, databases, software) relevant to contemporary business practices</li> </ul>	NA	<p>Not explicitly covered in this course</p>

## Appendix II

### Sample Participation Statements

**Participation.** In-class participation is 5% 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.

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

Comments: