ITP 456 – Blockchain: Capstone

Units: 4
Spring 2025

Lecture: TuTh 4:00pm-5:50pm
Location: VHE 206

Instructor: Jack Xu
Office: Remote
Office Hours: By appointment
Contact Info: boyuanxu@usc.edu

Teaching Assistant(s): <pending>
Office: Remote / By appointment
Office Hours: See Piazza
Contact Info: <pending>

IT Help:
USC IT (ITS): https://itservices.usc.edu/contact/
Viterbi IT:
https://viterbi.usc.edu/resources/vit/contact-us.htm

Catalog Description
Dive into the advanced technical and product skills required to understand the underlying (and overlooked) cryptographic principles of blockchain systems and build complete decentralized applications on public blockchains.

Course Description
- Peripheral components of decentralized applications
- Product design challenges of DApps
- Smart contracts written in the Solidity programming language
- Development environment required to write, test, and deploy EVM DApps
- Indexing tools written in GraphQL and AssemblyScript

Learning Objectives
After completing the course, students will be able to:
- Explain how encryption and digital signatures are related
- Cope with, accept, and understand why your idea is almost always useless
- Assess the pros and cons of various smart contract design choices
- Use Foundry in the development and testing process
- Use Hardhat to manage smart contract deployments and upgrades
- Use The Graph to index smart contract events

Prerequisite(s): ITP 356 && ITP 366
Co-Requisite(s): None
Concurrent Enrollment: None
Recommended Preparation: How to Use TypeScript – Beginner-Friendly TS Tutorial
Course Schedule:
https://itp456.notion.site/20251-Course-Schedule-17accee8d6a080a8be29f2a2b47a7743?pvs=4

Course Notes
Lectures are delivered face to face in the classroom when possible. Lectures are Zoom-enabled and recorded. All course materials will be made available through Notion and Piazza, including:
- Lecture slides
- Homework Assignments
- Readings
- Software details and instructions
- Grades and feedback
- Office hours

Announcements made in class and content posted on BrightSpace will supersede the contents of this syllabus.

Technological Proficiency and Hardware/Software Required
The assignments for this class will include both reading assignments as well as hands-on computer assignments. Students must bring their laptop computers to lecture sessions to participate in hands-on activities (loaner laptops are available for check out). Students will be given tutorials to gain familiarity with software tools.

Description and Assessment of Assignments

Homework: Most homework is computer based. Homework should be turned in on GitHub Classroom on time. Grading will be based on completeness, accuracy, and timeliness. These are individual effort assignments. All homework assignments are due exactly before the beginning of class of the following week (e.g., an assignment due on Week 2 is due Week 1 Tuesday 3:59PM PST).

Exams are entirely open book and Internet. However, no communication or use of LLMs of any kind is permitted.

Grading Breakdown

Homework	30%
Midterm Exam	40%
Final Project	30%
TOTAL	100%

Grading Scale
Course final grades will be determined using the following scale

A	93-100
A-	90-93
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	59 and below

Assignment Submission Policy
It is the responsibility of the student to make sure problem solutions and assignments are turned in on time. Make sure you follow the procedures outlined in each assignment (Blackboard submissions & GitHub Classroom).

Students are encouraged to work with their classmates. However, students must turn in their own, original work. Late homework submissions are NOT accepted.

Grading Timeline
Assignment grading will typically be completed 7 days after submission. Any exceptions will be announced in class or on Blackboard.

Additional Policies
The use of mobile devices or any communication software is not permitted during the exam. No make-up exams (except for documented medical or family emergencies) will be offered nor will there be any changes made to the Final Exam schedule, except as permitted by university rules.

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" https://policy.usc.edu/scampus-part-b/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Support Systems
Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. https://engemannshc.usc.edu/counseling/

National Suicide Prevention Lifeline - 1-800-273-8255
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. http://www.suicidepreventionlifeline.org

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call
Free and confidential therapy services, workshops, and training for situations related to gender-based harm.
https://engemannshc.usc.edu/rsvp/

Sexual Assault Resource Center
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: http://sarc.usc.edu/

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086
Works with faculty, staff, visitors, applicants, and students around issues of protected class. https://equity.usc.edu/

Bias Assessment Response and Support
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. https://studentaffairs.usc.edu/bias-assessment-response-support/

The Office of Disability Services and Programs
Provides certification for students with disabilities and helps arrange relevant accommodations. http://dsp.usc.edu

Student Support and Advocacy – (213) 821-4710
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. https://studentaffairs.usc.edu/ssa/

Diversity at USC
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. https://diversity.usc.edu/

USC Emergency Information
Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, http://emergency.usc.edu

USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime. http://dps.usc.edu