

# Solidity and Smart Contract Development

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Overview & Syllabus

# Syllabus - Subject to change

Lecture 1 - Blockchain Basics and Development

Lecture 2 - Solidity Fundamentals

Lecture 3 - Contracts and Complex Data Structures

Lecture 4 - ERC20 Tokens and Tokenomics

Lecture 5 - Intro to DeFi

Lecture 6 - Further DeFi Applications

Lecture 7 - NFTs

Lecture 8 - ReFi and NFT applications (Guest Lecture)

Lecture 9 - SDLC, Security and Testing

Lecture 10 - DAOs and Governance

Lecture 11 - Assembly and Gas Optimization

Lecture 12 - ZK and Rollups

# Grading

## ❖ **Homework - 40%**

- Weekly homework. Released on Sunday for the week. Submission deadline is next Sunday.
- Submit on your own Github account.

## ❖ **Final project presentation - 30%**

- Oral presentation (80%)
- Written submission (20%)

## ❖ **In class presentation - 20 %**

- Weekly on Monday
- Graded by professor (50%) and a class DAO (50%)

## ❖ **Participation - 10%**

- Github comments
- Gather Town chats
- Discord Activity

# In Class Presentations

- ❖ 15 min presentation + 3 min questions
- ❖ Every team member must speak during presentation
- ❖ These are not topics covered in class. They are an extension to the previous week's discussion.
- ❖ Grading
  - 50% graded by professor
  - 50% voted on by your fellow classmates through a class DAO
    - To avoid problems of collusion and manipulation encountered by small DAOs, professor reserves the right to veto the class vote

# Presentation Topics

- 22 January : Evaluate an open source community on Github
  - ◆ Intro of community, their Github stats (eg. stars/fork), interesting interactions (issues/comments/PRs). Finally, your assessment of this community.
  - ◆ No code.
- 5 February: Advanced Ethereum data structure: Tries
  - ◆ Introduction to tries and types of Ethereum Tries - State, Transaction, Receipts.
  - ◆ Walkthrough code snippet
- 19 February: Stability mechanisms of stablecoins
  - ◆ Collateral, Seigniorage, etc.,
  - ◆ No code. Finance focus.
- 26 February: Decentralized NFT storage: IPFS
  - ◆ Introduction to IPFS and different commercial NFT storage offerings
  - ◆ Focus on data and security challenges and innovations
- 11 March: Smart Contract security
  - ◆ Present a Smart Contract attack and prevention method
  - ◆ Code demonstration required.

# Presentation Groups

Group 1		Evaluate a Community
Group 2		Ethereum Tries
Group 3		Stability Mechanisms
Group 4		NFT Storage
Group 5		Smart Contract Attacks

# Final Project

- Choose a Topic from next slide and begin working on it as soon as possible.
- Deliverables - due date TBD
  - Oral Presentation - 80%
  - Written Description (approx 500 words blog post) - 20%

## Oral Presentation (20 - 25min + 5min questions)

- ❖ 5min startup pitch style
  - What is the value / problem addressed by your project?
- ❖ 10min project demo
- ❖ 10min Solidity code considerations
  - How did you structure your project and why?
  - What considerations did you make while coding (eg. gas optimization)

## Written Blog Post

500 words

Description of your project and key features.

Mention interesting technical aspects.

# Final Project - Topic List

All projects must be deployed to a testnet !!

1. Marketplace - what good or service?
2. Web3 game
3. IPFS storage dApp
4. Voting dApp
5. Crypto payments through QR codes
6. Time-Lock Wallet
7. Real Estate fractional NFTs
8. Propose your own - but must be sufficiently complex



# Final Project - Groups

## Group 1

Nathan

Yuren

Messaoud-Nasserddine

## Group 2

Matthieu

Yunjie

Eduardo

## Group 3

Nicolas

Maximo

Hortense

## Group 4

Anthony

Calida

Stellan

# Final remarks - web3 is about networking!

As a young industry, it's all about who you know and your reputation.

Some opportunities during our course:

1. Some guest lectures may have free or paid work
2. PSBW - 8 - 12 April
3. Attend Hackathons!

**Have a great semester and good luck!**