

# The Hong Kong University of Science and Technology

## UG Course Syllabus

[Course Title] Blockchain, Cryptocurrencies and Smart Contracts

[Course Code] COMP4541

[No. of Credits] 3-credit

[Any pre-/co-requisites] Prerequisite(s):COMP 2012 OR COMP 2012H

**Name:** [Instructor(s) Name] Dr. WU Daoyuan

**Email:** [Your Email Address] daoyuan@cse.ust.hk

### Course Description

This course provides a holistic introduction to Blockchain Protocols and Smart Contracts. The students will learn how cryptocurrencies such as Bitcoin and Ethereum work, why they are secure, and how they can be used to implement real-world financial contracts without relying on trusted third-parties or centralized control. They will also learn to avoid, detect, and fix common security vulnerabilities in smart contracts.

### List of Topics

1. Introduction to Blockchain and Cryptography
2. Bitcoin and Its Mechanism
3. Bitcoin Scripts and Wallets
4. Consensus in the Internet Setting
5. Incentives and Accountability in Consensus
6. Ethereum and Its Virtual Machine (EVM)
7. Programming in Solidity
8. Common Vulnerabilities in Smart Contracts
9. Stablecoins and Lending Protocols
10. Decentralized Exchanges
11. Maximal Extractable Value (MEV); NFT
12. Payment Channels and State Channels
13. Rollups: Optimistic and ZK

### Assessments:

Assessment Task	Contribution to Overall Course grade (%)
4 Homework 10% each)	40%
Individual project	30%
Final Exam	30%
Total	100%

### Required Texts and Materials

N/A

**[Optional] Additional Resources**

N/A