

## **Segregated Witness and Lightning Network: Implications on the Future of Payment**

In this 2-day course, we will do a deep dive into the recent development in the Bitcoin and Litecoin blockchains, namely the implementations of Segregated Witness (SegWit) and the Lightning Network, including the community dispute on the activation of SegWit on Litecoin.

The course will cover a brief introduction on the structure of blockchains, and the recent debate on the scalability issues of the Bitcoin blockchain, which eventually resulted in a hard-fork on the Bitcoin blockchain. The course will include a thorough review on the design principles of Segregated Witness, how it solves the transaction malleability issue and eventually became the enabling technology for the Lightning Network.

The course will also do a comprehensive overview on Lightning Network. Participants will be able to see how a fast payment channel is established, how multiple payment channels are connected, and how transactions are routed across the whole Lightning Network.

### **Objective**

#### **A. Knowledge and Understanding (Theory Component)**

At the end of this course, participants should be able to:

- Describe the structure and mechanism of Blockchains
- Understand the scalability issues on the Bitcoin blockchain and the need for SegWit
- Explain the principles of the Lightning Network, and its strength and weakness
- Illustrate how SegWit and Lightning Network were activated on Litecoin

#### **B. Key Skills (Practical Component)**

At the end of this course, participants should be able to:

- Create, send and receive Bitcoin/Litecoin transactions
- Create an altcoin based on Bitcoin's code
- Use the Lightning Network

## Topics

Time	Agenda
<b>Day 1</b>	
09:00 – 09:15	2-Day Course Overview
09:15 – 10:45	History of cryptocurrencies: <ul style="list-style-type: none"> <li>- Pre-history of cryptocurrencies</li> <li>- Bitcoin Creation</li> <li>- Litecoin Creation</li> </ul>
10:45 – 11:00	Break
11:00 – 12:30	Deep dive into Bitcoin/Litecoin Blockchain structure <ul style="list-style-type: none"> <li>- Structure of a transaction</li> <li>- Bitcoin/Litecoin addresses and base58 encoding</li> <li>- Multisig transactions and smart contracts</li> <li>- Merkle Tree</li> <li>- Demo of blockchain explorer/transaction creation, sending and receiving.</li> </ul>
12:30 – 14:00	Lunch
14:00 – 15:30	Consensus and mining <ul style="list-style-type: none"> <li>- What is consensus</li> <li>- Proof of work</li> <li>- Bitcoin and Litecoin’s mining mechanisms</li> <li>- Comparison and discussion on proof of work and proof of stake</li> </ul>
15:30 – 15:45	Break
15:45 – 17:00	Bitcoin/Litecoin scalability and transaction malleability issues <ul style="list-style-type: none"> <li>- Transaction malleability / The bankruptcy of Mt.Gox.</li> <li>- Block-size debate</li> <li>- SegWit</li> <li>- Soft-fork and hard-fork</li> <li>- How did the Litecoin team activate SegWit on Litecoin</li> <li>- Bitcoin Cash</li> </ul>
17:00 – 17:30	Assessment
<b>Day 2</b>	
09:00 – 09:15	Overview of the Day
09:15 – 10:45	Lightning Network – Bidirectional Payment Channels <ul style="list-style-type: none"> <li>- What is Lightning Network</li> <li>- The application of Lightning Network &amp; the implications</li> <li>- Lightning Network transaction in one channel</li> </ul>
10:45 – 11:00	Break
11:00 – 12:30	Lightning Network – Hash Time-Locked Contracts <ul style="list-style-type: none"> <li>- Lightning Network transaction between multiple channels</li> </ul>
12:30 – 14:00	Lunch
14:00 – 15:30	Lightning Network – Completing a transaction and Routing
15:30 – 15:45	Break
15:45 – 17:00	Lightning Network - demo
17:00 – 17:30	Assessment

## Requirements

- Attendees should have at least a basic understanding of programming
- Attendees have to bring along their own laptop

**Duration: 2 days**

**Venue: Singapore University of Social Sciences** (formerly known as SIM University)

**Minimum number to run: 25 participants**

**Certificate of participation is awarded upon 75% attendance for the course**

**(As the university was renamed recently on 17 March 2017, we will be reprinting our course certificates to incorporate the new name and logo. As such, you will receive your certificate at a later date.)**

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## Trainer's Profile



**Dr. Wang Xinxi**  
***Director and Founding Member, Litecoin Foundation***

Dr. Xinxi Wang is the founder and CEO of Coinut.com and a co-founder of the Litecoin Foundation. He obtained his Ph.D. degree in computer science from National University of Singapore in 2015 with a focus on machine learning/recommender systems, and before that, he obtained his bachelor degree from Harbin Institute of Technology in China. Xinxi gained years of experience in automated trading in the forex markets before diving into the fascinating cryptocurrency world, combining his background in computer science and financial trading. In 2014, he founded Coinut.com, one of the most advanced cryptocurrency exchanges in the world.

In 2016, Xinxi joined the Litecoin Core development team and quickly realized that a shortage of resources was limiting Litecoin's progress. With that in mind, he co-founded the Litecoin Foundation in Singapore and has helped raise more than \$1M from the Litecoin community to support Litecoin's development. Xinxi lives in Singapore and enjoys traveling around the world.