



# SECURITY TOKEN ALLIANCE

## **Blockchain Learning Syllabus**

Updated July 2019



**Step 0: Get Hype! Learn about an exciting blockchain use-case: Security Tokens, with this video:**

<https://youtu.be/gvy3jZ8fXVE>



Penetrating the Security Token Industry - The TRUTH About Security Tokens

**Step 1: Follow STA on [LinkedIn](#) and [Medium](#) to always get new updates.**

The ultimate, step-by-step guide to learn blockchain from scratch and prepare for your future job.

It is organised in a step-by-step way. Do not skip ahead. Do all the exercises that are demanded. Whenever possible, write with a pen and paper instead of on the computer only. This will make you remember more of the material studied.

In general, prefer official documentation, if it is well-written, over external tutorials. Be very selective about the educational materials you consume. If you learn the wrong



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stuff, it may be worse than if you did not learn anything at all. It is harder to re-learn the correct behaviour/skill/knowledge. Spend lots of time selecting what you study.

**Do not expect that you will get a job just because you finished this course. Be realistic but also optimistic.\***

Blockchain is a multidisciplinary field. Instead of going through a standardised curriculum, such as Mathematics or Engineering, you have to be initially analytical in your approach to learn separate things really well and then synthesise them together.

\*Go for the extra mile and 'delete' old contributions, internships and projects to keep your portfolio state of the art. A well made showcase of your skills always outperforms a CV. (For example a well made webpage. Examples: [1](#), [2](#))

Especially in Blockchain projects get outdated quickly. Nothing wrong with having 2 sections/tabs/places to put your work, showcase or your most recent work in one section and the remainder in the other. Same with certificates and other credentials. This applies to web pages, Social media such as LinkedIn as well as your CV or any other lead generating outlet.

**Always balance your study with practice. Make it at least 50% theoretical study and 50% practice.**

Examples of practice:

- Your own public blockchain with open source contributors
- Your own tokens with different standards
- Internship or work related project that you can display publicly

**All links and content in this syllabus are free!**

## Blockchain Overview

- Bitcoin White Paper: <https://bitcoin.org/bitcoin.pdf>

STA note: The bitcoin white paper is the single best place to start learning blockchain. Yes, it is very complicated, but it's also the starting point for cryptocurrency and blockchain, and it's only just over a decade old. It gives you an insight into why



blockchain is so disruptive -- it enables you to put your trust in a mathematical network, free of human error, rather than unelected intermediaries.

- Understanding the Bitcoin white paper:  
<https://medium.com/@professor.crypto.nuggets/the-bitcoin-whitepaper-1aa42ad28e43>

## Blockchain Origins

As a quick recap, but also for a deeper understanding (and more context), let's take a look where blockchain comes from and how it all came to be. Like the name indicates, a blockchain is a chain of blocks that contains information.

This technique was originally described in 1991 by a [group of researchers](#) and was originally intended to timestamp digital documents so that it is not possible to backdate or tamper with them (comparable to a notary).

However, this went by mostly unused until it was adapted by Satoshi Nakamoto in 2009 to create the digital cryptocurrency Bitcoin, the first ever use case of Blockchain.

A block would always include a data, it's hash and the hash of the previous block (excluding the very first block in a blockchain).

To mitigate tampering, Satoshi also added proof-of-work and combined all these parts to come up with the basic structure of what is now known as blockchain.

*Side note: Satoshi Nakamoto is a pseudonym of either a person or a group of people who developed Bitcoin, authored its white paper and deployed Bitcoins original reference implementation. Satoshi published a paper, titled "Bitcoin: A Peer-to-Peer Electronic Cash System" in October 2008 and released the first software (the mentioned first use case) that launched the Bitcoin network in January 2009. The question of who Satoshi Nakamoto is has still not been answered and has generated a lot of different theories and speculations. Satoshi stopped working on the Bitcoin project in 2011 and subsequently disappeared from public life.*

STA note: Now that you've read through, know it's origin and surely didn't understand 100% of the white paper, let's get another perspective. This is a more gentle analysis of the bitcoin white paper, to help solidify the concepts in your mind.



- Understand the Market and Tokens:

<https://medium.com/birds-view/mapping-the-decentralized-world-of-tomorrow-5bf36b973203> and <https://news.earn.com/thoughts-on-tokens-436109aabcbe>

STA note: You know have a fundamental technical understanding, but it's important to understand the blockchain market and blockchain use-cases as well, beyond bitcoin. Here you'll learn about tokens, protocols, middleware, capital, and so on.

- Why Interoperability Matters:

<https://outlierventures.io/research/convergence-ecosystem-forget-blockchain-applications-without-this-one-special-trick/>

STA note: We added this to the syllabus because it's important that you understand some key terms that are thrown around -- like "interoperability" -- and the associated challenges and work being done.

- Understand IPFS:

<https://medium.com/@ConsenSys/an-introduction-to-ipfs-9bba4860abd0>

STA note: We put this in here to give you a solid understanding of a real-world, and practical use-case: distributed data storage. This will help you in discussions when the question of "what is blockchain used for besides crypto?" comes up.

- Blockchain Demo 2.0

STA note: We've been reading about blockchain a lot, but it's good to get a more hands-on, visual understanding as well. This awesome tool lets you do just that to help you put the theory to practice.

- "How to Teach Your NON-NERD Friends (and Family) How Blockchain Works – While Having Fun":

<https://medium.com/loom-network/how-to-teach-your-non-nerd-friends-and-family-how-blockchain-works-while-having-fun-71f21aae7d03>

STA note: Now that you've read about and handled blockchain and some use-cases, let's put your basic understanding to the test.



## Ethereum Blockchain

- Ethereum White Paper: <https://github.com/ethereum/wiki/wiki/White-Paper>

STA note: This white paper will give you *a lot* to chew on. Ethereum was created as a response to bitcoin's lacking ability to put Turing-complete code on the blockchain. While Bitcoin lets you decentralize payment networks, Ethereum lets you decentralize virtually *anything*.

## Cryptocurrency

- [Princeton's Cryptocurrency Technology Course](#)

STA note: This Princeton overview of crypto will repeat some of the concepts you've learned - but also go deeper in other areas. It's good to learn from multiple sources and formats (now video) to fill in any information gaps.

- [coincap.io](https://coincap.io)
- [A guide to the top 25 cryptocurrencies](#)

STA note: Now that we've again analyzed cryptocurrencies, in their theory and code, let's take a look at some cryptocurrencies on the market. Getting some market understanding, and seeing the hundreds of billions of dollars of crypto on the blockchain being traded, will hopefully make the material a little more real-world.

## Communities

- [r/Cryptocurrency](#)
- [r/Bitcoin](#)
- [r/Bitcoinbeginner](#)



STA note: Now that you've read several white papers, played with a blockchain, practiced your skills in a game, watched videos, analyzed the market, and more, it'll be useful to share your knowledge with others in communities.

## Building Your Own Blockchain

- <https://medium.com/crypto-currently/lets-build-the-tiniest-blockchain-e70965a248b>

STA note: Now it's time to bring your skills to the next level and build your own (primitive) blockchain. This is a great guide to help you understand exactly "what blockchain *really* is," as you'll be coding your own.

## Smart Contracts

- <https://medium.com/@davekaj/how-hard-is-it-to-become-a-smart-contract-developer-f159bafd8018> (for a high-level overview)
- <https://blockgeeks.com/guides/smart-contracts/> (a more in-depth guide, but still not very hands-on)
- [https://monax.io/learn/smart\\_contracts/](https://monax.io/learn/smart_contracts/) (a more nuanced explanation)
- <https://www.freecodecamp.org/news/how-to-write-and-deploy-your-first-smart-contract-341d5e2ffb35/> (finally, time to get your hands dirty)

STA note: Smart Contracts are the eyes, hands, and feet of blockchain. They're how you interact with the blockchain, how the blockchain interacts with the world, and the core of every blockchain use-case. In a nutshell, Smart Contracts are code on the blockchain. That code can represent a token, an ICO, an STO, a full-blown decentralized application, a cryptocurrency, and any number of functions.

## Learn Solidity

- <https://solidity.readthedocs.io/en/v0.5.3/> (official documentation is always a good place to get 100% up-to-date information)
- <https://blockgeeks.com/guides/solidity/> (an amazing guide, to get you through the logic and theory)
- <https://blog.ethereum.org/2016/06/19/thinking-smart-contract-security/> (now that you've learned the basics of the language, it's time to understand security)
- <https://www.youtube.com/playlist?list=PLH4m2oS2ratdoHFEkGvwvd7TkeTv4sa7Z> (now that we've gone through a lot on paper, it'll be good to follow along with video lectures)

STA note: Solidity is the leading programming language for Ethereum smart contracts, and Ethereum is the leading blockchain 2.0. Therefore, Solidity is the logical first-step language to



learn. Solidity is kind of a messed-up version of JavaScript, so if you have some JavaScript experience, perfect! If you have no programming experience at all, definitely learn another language first.

## Learn Vyper

- <https://vyper.readthedocs.io/en/v0.1.0-beta.10/> (as before, we'll start with the official documentation, to avoid going straight to 2nd-hand and 3rd-hand sources)
- <https://blockgeeks.com/guides/understanding-vyper/> (now, time for a guide to give you a bit more flexible approach to learning Vyper step-by-step)
- <https://learnxinyminutes.com/docs/vyper/> (now let's get another perspective on learning the language. Unfortunately, there are no Vyper video course out there yet, but this is a good alternative).

STA note: Vyper is a less well-known, but great alternative to Solidity for programming smart contracts. Vyper is syntactically a lot more similar to Python, and therefore easier to learn, code, and audit than Solidity, which is somewhat similar to JavaScript.

## Learn Truffle

- <https://medium.com/@tapdev/your-first-truffle-dapp-an-attempt-at-a-beginners-guide-to-the-truffle-framework-c7edf0493b7> (here we'll start with a more basic guide, as the documentation can be a bit heavy)
- <https://www.trufflesuite.com/docs/truffle/overview> (now it's time for the official documentation)
- <https://www.coursera.org/lecture/decentralized-apps-on-blockchain/truffle-development-truffle-ide-part1-LdTy3> (to help solidify the concepts you've learned through text, let's go through a series of (free) videos)

STA note: Now that we've learned about blockchains, Smart Contracts, and coding those Smart Contracts with blockchain programming languages like Solidity and Vyper, it's a good time to learn the Truffle framework -- an Ethereum development environment.

## Learn Web3

- <http://www.dappuniversity.com/articles/web3-js-intro> (let's kick it off with the basics, taught through video, before diving into the documentation and projects)
- <https://web3js.readthedocs.io/en/1.0/getting-started.html> (now we can look at the comprehensive documentation to recap what we learned and fill in any gaps in our knowledge)





- <https://hackernoon.com/learn-web-3-0-by-actually-deploying-an-application-on-it-hands-on-approach-9141ad88588f> (finally, it's time to get your hands dirty with a practical application of Web3)

STA note: There wasn't really a good part of the syllabus to fit this into, but we're putting it towards the end because it's a very practical part of blockchain programming, which is good to have after laying the foundations of theory.

## Building an Ethereum DApp (final project)

- <https://cs251crypto.stanford.edu/18au-cs251/hw/proj3.pdf>

STA note: In this project you'll follow an assignment from an open-source Stanford course. You'll need quite a bit of prerequisite knowledge in programming, logic, and blockchain, so this is not for the faint of heart. We encourage you to join others in the STA community in collaborating on this assignment!

## Building a Security Token (optional project)

STA note: We're making this an optional project, because Security Tokens are admittedly a currently niche market within blockchain. However, it's good to learn the ins-and-outs of a highly practical, real-world application such as Security Tokens. Essentially, Security Tokens are securities, on the blockchain. They are securities improved with greater operational efficiency through trustless digital wrappers. There are no real courses out there yet (STA is making one, so stay tuned!), so we'll throw together a bunch of resources, and leave it to you to choose how to make it best).

- <https://github.com/ethereum/EIPs/issues/1411> (let's start off with a fairly well-known Security Token standard: ERC-1400)
- <https://github.com/ethereum/EIPs/issues/1404> (now let's look at what's essentially a modification of ERC-1400)
- <https://eips.ethereum.org/EIPS/eip-1450> (we'll continue looking at various standards, and you can decide what's missing and look for areas of improvement)
- <https://eips.ethereum.org/EIPS/eip-1462>
- <https://eips.ethereum.org/EIPS/eip-902>
- <https://eips.ethereum.org/EIPS/eip-884>
- <https://github.com/Securrency/SmartContraX> (now, let's look at some standards being used by companies in the Security Token space)
- <https://github.com/OpenFinanceIO/smart-securities-standard>
- <https://github.com/harborhq/r-token>



## Final Step: Share What You Learned

STA note: Follow our LinkedIn, and share your learnings in a post tagging Security Token Alliance *after* completing the syllabus material.

## Appendix Materials

- [Why Utility Tokens Suck — A Case for Security Tokens](#)

STA note: You've learned all about tokens and cryptocurrencies, and even made your own blockchain applications throughout the course of this syllabus. Here's a more nuanced approach to tokens -- understanding Utility Tokens versus Security Tokens will help your understanding of the market.

- [Analysis Suggests 94% Chance That Security Tokens Will Take Off](#)

STA note: Here we'll give you an understanding of the market reasons behind why Security Tokens will take off, which will hopefully inspire you to continue learning about this high-growth, high-potential vertical.

- [Is an STO a good Capital Raise Option?](#)

STA note: TLDR: Yes if the alternative is an ICO or IEO. Maybe if the alternative is a private placement. Not yet if the alternative is an IPO.

- [V20 — Crypto's Bretton Woods Moment](#)

STA note: Taking part in industry events is an amazing way to share knowledge and network with others. Now that you've become an expert in blockchain, you'll be able to add massive value to others in the space.

- [STOs Are Not The Next ICO](#)

STA note: You've heard of ICOs, but if you want to understand other blockchain-based capital raises, it'd be great to look into STOs. Here's a primer.

- [The Tokenization Industry Sucks At "Theory of Mind" — And That Could Kill It](#)

STA note: Now that you understand the concept of "Theory of mind" and know that there are others out there who have a thinking mind like you to the extent with which you possess theory of mind, you exhibit empathy and comprehend what it means to tokenize meaningful assets.



## Author Biography



Frederik Bussler is the Founder of the [Security Token Alliance](#), the world's largest think tank for the Security Token industry with over 67 partners, as well as Chairman at the [World Data Science Forum](#), CEO at [bitgrit](#), and advisor to blockchain startups including [SHORTEX Cryptoexchange](#) and [klimazone Labs](#). As a public speaker, he has presented for audiences including [IBM](#), [Nikkei](#), [Slush Tokyo](#), and the [Chinese government](#), and is featured in outlets including [Forbes](#) and [Yahoo](#). He has reached audiences of over 4 million on [social media channels](#), and his interviews with Japanese outlets such as NewsTV have been viewed over 1 million times.