Overview

Blockchain technology is a form of decentralized database that allows for the secure exchange of value without reliance on trusted intermediaries. Blockchain is the foundation for cryptocurrencies such as Bitcoin, as well as for distributed ledger platforms used by enterprise consortia in various industries. Many believe that blockchain solutions have revolutionary potential. They promise to replace legal enforcement with technical mechanisms of cryptographic consensus as the means of generating trust. The technology has generated significant excitement, investment, and entrepreneurial activity in recent years. However, the business value of blockchain-based solutions is uncertain, cryptocurrency valuations are speculative, and there are serious legal, regulatory, and governance challenges to be addressed. This course is designed to give students the tools for critical assessment of ongoing developments in this evolving area.

Instructor

Kevin Werbach
Professor of Legal Studies & Business Ethics
673 Huntsman Hall  |  (215) 898-1222  |  werbach@wharton.upenn.edu

Office Hours: Tuesday/Wednesday 1:30-2:30pm

Learning Objectives

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

1. Explain the essential features of blockchain, cryptocurrencies, and distributed ledger technology.
2. Evaluate current and potential business use cases.
3. Describe the major legal and regulatory challenges these technologies raise.

Course Requirements and Grading

The course is designed to be generally accessible. It does not require any technical skills, finance knowledge, or prior experience with cryptocurrencies.

The class meets once a week, for three hours. For most weeks after the first few sessions, we will have a guest speaker for half the time. You are expected to complete assigned readings and prepare for discussion with the guest speaker prior to each class. I will use a mixture of lecture, discussion, and in-class interactive activities; you are expected to actively engage in class.
Your grade in the course will be comprised of the following elements:

**Choose Your Own Adventure (45%)**
- You will be provided with a list of possible assignments. You must complete at least three of them, which are each worth 15% of your grade. What assignments you complete, in what order, is up to you, although many of the assignments are best done after class sessions covering relevant material.
- You may also contact the professor to propose alternate assignments of your own design. With approval, these will receive equivalent credit.
- If you submit two assignments before a monthly deadline, you will receive the higher grade. However, you cannot submit additional assignments later to receive credit for prior months.
- Additional details are provided on the Canvas assignment page.

**Guest Speaker Questions (5%)**
- We will have guest speakers for at least seven class sessions. You must prepare questions for five of them, with each submission worth one point, up to a maximum of five. Submit your questions, and explanations for them, to the relevant assignment on Canvas. Your submissions will be graded for completion.

**Midterm Exam (15%)**
- There will be a midterm exam to complete online during the week of October 9, when the class will not meet. It will be 60 minutes in length, and available on Canvas.

**Final Exam (20%)**
- The final exam will be administered during the last class session, on December 4. It will be 80 minutes in length, and will be completed online on Canvas. The exam will include material from the entire semester, but will focus on concepts and readings after the midterm.

**Participation (15%)**
- I will assess your overall contribution to the course. Attendance is a factor, but not the primary one. Active involvement in class discussions and activities is more important.

<table>
<thead>
<tr>
<th>DATE</th>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 28</td>
<td><strong>Blockchain and the Trust Challenge</strong></td>
<td>Werbach, Chapter 1&lt;br&gt;Andreesen, <em>Why Bitcoin Matters</em>&lt;br&gt;Stinchcombe, <em>Blockchain Is Not Only Crappy Tech</em>&lt;br&gt;Iansiti &amp; Lakhani, <em>The Truth About Blockchain</em></td>
</tr>
<tr>
<td></td>
<td>- Course overview</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Introduction to blockchain</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Forms of trust</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- The need for a new trust architecture</td>
<td></td>
</tr>
<tr>
<td>September 4</td>
<td><strong>Money: From Yap Stones to Digital Cash</strong></td>
<td>Martin, Chapter 1&lt;br&gt;Narayanan et al, <em>Preface</em> pp. 1-13</td>
</tr>
<tr>
<td></td>
<td>- Money as a form of trust</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Financial history and regulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- What’s wrong with the money we have?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cryptocurrency as a financial revolution</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Guest speaker: Caitlin Long</strong></td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Read</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>September 11</td>
<td><strong>Cryptography and Distributed Systems</strong>&lt;br&gt;- Information security as a form of trust&lt;br&gt;- Public and private keys&lt;br&gt;- Digital signatures&lt;br&gt;- Hashing&lt;br&gt;- Byzantine fault tolerance</td>
<td>Read Narayanan et al, <em>Preface</em> pp. 13-18; <em>Chapter 1</em></td>
</tr>
<tr>
<td>September 18</td>
<td><strong>Bitcoin and Cryptocurrencies</strong>&lt;br&gt;- How Bitcoin achieves trust&lt;br&gt;- Proof of work consensus and mining&lt;br&gt;- Major cryptocurrency networks&lt;br&gt;- Wallets and exchanges</td>
<td>Read Werbach, Chapter 2&lt;br&gt;Nakamoto, <em>Bitcoin Whitepaper</em></td>
</tr>
<tr>
<td>October 2</td>
<td><strong>Beyond Money: The World Computer</strong>&lt;br&gt;- Smart contracts&lt;br&gt;- Ethereum and decentralized applications&lt;br&gt;- The DAO Hack</td>
<td>Read Werbach, Chapter 3&lt;br&gt;Szabo, <em>Smart Contracts: Building Blocks for Digital Markets</em>&lt;br&gt;Spode, <em>The Great Cryptocurrency Heist</em>&lt;br&gt;Dixon, <em>Why Decentralization Matters</em></td>
</tr>
<tr>
<td>October 9</td>
<td><strong>Yom Kippur – No Class</strong>&lt;br&gt;<strong>Watch video: Token Offerings</strong>&lt;br&gt;- Tokens as a funding mechanism&lt;br&gt;- The ICO phenomenon&lt;br&gt;- Securities regulation</td>
<td>Read Cohney et al, <em>Coin Operated Capitalism</em>, Parts I and II&lt;br&gt;PWC, <em>ICOs: A Strategic Perspective</em>&lt;br&gt;Srinavasan, <em>Thoughts on Tokens</em>&lt;br&gt;SEC, <em>Framework for Analysis of Digital Assets</em></td>
</tr>
<tr>
<td>October 23</td>
<td><strong>Public Blockchain</strong>&lt;br&gt;- Cryptoeconomics&lt;br&gt;- Consensus mechanisms</td>
<td>Read Werbach, Chapter 5&lt;br&gt;Catalini &amp; Gans, <em>Some Simple Economics of the Blockchain</em></td>
</tr>
<tr>
<td>Date</td>
<td>Topic</td>
<td>Read Sources</td>
</tr>
<tr>
<td>------------</td>
<td>----------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| October 30 | **Enterprise Blockchain**  
- Managing decentralized networks  
- The value of permissionless systems  
- When do you really need a blockchain?  
- TradeLens case study | Read  
Werbach, Chapter 4  
World Economic Forum, *Blockchain Beyond the Hype*  
Maersk: Betting on Blockchain | Lane Rettig |
| November 6 | **Blockchain Meets Law**  
- Regulation of cryptocurrency services  
- Global and state-level approaches  
- Legal analysis of smart contracts  
- Code vs. Law | Read  
Werbach, Chapter 8  
| November 13| **Will Crypto Transform Global Finance?**  
- Stablecoins  
- Facebook Libra  
- Cryptocurrency markets beyond the U.S. | Read  
Libra White Paper  
Masterethecrypto, *Guide to Stablecoin*  
Reuters, *Cryptocurrency Basis to Shut Down*  
GCR, *The Small Handbook to Asia Crypto* (skim) | Joyce Yang |
| November 20| **Governance and Identity**  
- Theories of governance  
- Blockchain governance struggles  
- On-chain governance  
- Privacy coins  
- Self-sovereign identity | Read  
Werbach, Chapter 7  
De Filippi et al, *The Invisible Politics of Bitcoin*  
Buterin, *Notes on Blockchain Governance*  
Olshansky, *Do Blockchains Have Anything to Offer Identity?* | TBD |
| December 4 | **Where Do We Go From Here?**  
- Scaling blockchains  
- Re-decentralizing the internet  
- Emerging issues | Read  
Werbach, Chapter 11  
Dixon, *Why Decentralization Matters*  
Croman et al, *On Scaling Decentralized Blockchains* | |

**Final Exam**