

Outline for ECE Blockchain course

Course title: An Introduction to Blockchain Technology

Schedule: Fall: Thursday 6:10 pm – 8:50 pm (TBC)

Instructor: Hasshi Sudler

Lecturers: Hasshi Sudler, Jim Solderitsch, Pritpal Singh, Perry Hartswick (IBM)

Course Objective: The course objective is to provide both a technical and practical application analysis of distributed ledger technology (DLT) for both public and permissioned blockchains. The course describes the basis for transaction encryption and signing, immutability of Merkle trees, and avoiding the double spending problem. It further explores how blockchains are created and maintained using Proof of Work (PoW) or Proof of Stake (PoS), and how blockchains are being applied using smart contracts in distributed applications (dApps).

Course expectations:

Background is encouraged in cryptography and Web application development.

Students will be required to complete a project as part of the course.

Lectures Topics

Class	Description
Lecture 1	Overview of Blockchain architecture - history of blockchain development
Lecture 2	Public versus Private blockchains
Lecture 3	Proof of Work (PoW) versus Proof of Stake (PoS)
Lecture 4	Signing blocks and avoiding double spending
Lecture 5	Immutability of the blockchain - review the Merkle tree
Lecture 6	Development of distributed applications (dApps)
Lecture 7	Bitcoin blockchain and Ethereum blockchain structures
Lecture 8	Writing smart contracts using Ethereum Solidity
Lecture 9	Encrypting information and assets as tokens
Lecture 10	The evolving Blockchain Web application stack
Lecture 11	Using Blockchain for cryptocurrencies - advances in hard forks and block signing
Lecture 12	Application of DLT to energy transfer (Prital Singh)
Lecture 13	Applying DLT to asset management and land titles (Hasshi Sudler)
Lecture 14	Applying DLT to supply chain management
Lecture 15	Applying DLT to addressing illicit trade and piracy (Hasshi Sudler and Peggy Chaudhry)
Lecture 16	Economic implications of Blockchain technology