Course Number	EBB 6102
Course Title	**Blockchain components & architecture**
Course Outline	**Module 1: Blockchain Fundamentals** ● Basic crypto primitives: hash, signature, hashchain to blockchain ● Basic consensus mechanisms ● Blockchain architecture and design considerations ● Requirements for consensus protocols. ● Scalability aspects of blockchain consensus protocols. **Module 2: Consensus Mechanism** ● Proof of Work (PoW) consensus mechanism ● Alternative consensus mechanisms: Proof of Stake (PoS), Delegated Proof of Stake (DPoS), Byzantine Fault Tolerance (BFT), and more ● Decomposing the consensus process ● Consensus protocols for permissioned blockchains. **Module 3: Permissioned Blockchains and Applications** ● Design goals for permissioned blockchains ● Introduction to Hyperledger Fabric ● Hyperledger Fabric components ● Chaincode design and implementation ● Beyond chaincode: Fabric SDK and front end, Hyperledger Composer tool ● Settlements, KYC, and capital markets on blockchain ● Blockchain in insurance. **Module 4: Blockchain for Supply Chain and Government** ● Use case: Blockchain in trade supply chain ● Provenance of goods and visibility on blockchain ● Trade supply chain finance on blockchain ● Invoice management and discounting on blockchain ● Digital identity and records on blockchain. ● Record keeping between government entities on blockchain ● Public distribution system and social welfare systems on blockchain. **Module 5: Blockchain Cryptography, Privacy, and Security** ● Overview of blockchain cryptography and security ● Privacy on blockchain ● Recent works on scalability ● Secured multi-party computation on blockchain ● Blockchain for science: making better use of the data-mining network. ● Case studies: comparing ecosystems - Bitcoin, Hyperledger, Ethereum, and more.
Learning Outcome	● Students will be able to explain the core concepts and components of blockchain technology. ● Students will be able to design and implement basic blockchain architectures and understand the security and consensus mechanisms required for their development. ● Students will be able to analyze the use of blockchain in various sectors and identify opportunities for its implementation. ● Students will be able to develop secure cryptographic protocols on blockchain and compare and contrast different blockchain ecosystems, such as Bitcoin, Hyperledger, and Ethereum.
Assessment Method	Quiz / Assignment / ESE

TEXTBOOKS:

- "Blockchain Basics: A Non-Technical Introduction in 25 Steps" by Daniel Drescher, Apress.
- "Blockchain Revolution: How the Technology Behind Bitcoin Is Changing Money, Business, and the World" by Don Tapscott and Alex Tapscott, Portfolio.
- "The Basics of Bitcoins and Blockchains" by Antony Lewis, O'Reilly Media.