



E-learning Course

Blockchain-based Microcredentials

5.1 Introduction to Blockchain



Co-funded by the
Erasmus+ Programme
of European Union

Co-Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.
Project No: 2024-1-SK01-KA220-ADU-000253202

Introduction

Module 5 will introduce the concept of Blockchain technology and how it relates to microcredentials. Materials will explain the basic components, roles and operations of blockchain networks, then move on to analysing the benefits of blockchain-based microcredentials. Learners will also be familiarised with the existing challenges in blockchain-microcredential integration.

This is the first unit of the Module:
5.1 Introduction to Blockchain



Table of Contents

Title	Slide
Introduction to Blockchain	4-5
Key Blockchain Terms	6
Basic Blockchain Features	7-9
Learning Resources	10
References	11

Introduction to Blockchain



What is Blockchain Technology?

At a glance...

Formal definition:

Blockchain technology is a distributed ledger technology that utilizes peer-to-peer networks to maintain immutable records of transaction in a decentralised fashion.

In simpler terms:

Blockchain can be thought of as a digital, incorruptible record book, storing information for every asset and change on the network. This works without any authority in control or central storage. Instead, information is stored by many peers.



Introduction to Blockchain

What Blockchain Technology is NOT:

Not a cryptocurrency:

While cryptocurrencies such as Bitcoin and Ethereum made Blockchain famous, Blockchain itself is not a cryptocurrency, but only the technology behind them. There are many different uses for Blockchain technology outside of cryptocurrencies.

Not a programming language:

Programs and Applications can run on some Blockchain Networks, using various programming languages (Solidity, GoLang etc.), but Blockchain itself is not a programming language.

Not AI or Machine Learning:

While often referenced together as popular technologies, Blockchain is completely separate from AI or ML.

Key Blockchain Terms

Users send requests to interact with the blockchain network.

Transactions are all the interactions with the network sent by the users.

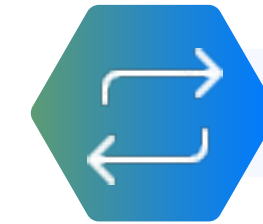
Nodes maintain the network, validate transactions and hold copies of all network records.

Blocks contain sets of verified transactions. Each **block** is connected to the previous one, forming a chain .

Consensus is the core principle that all **nodes** must agree on the validity of a **transaction** and the records of the network at all times.



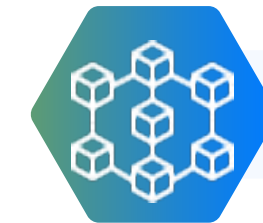
Users



Transaction



Nodes



Blocks



Consensus

Basic Features of a Blockchain Network



Decentralisation

In a Blockchain Network, there is no central storage point that can be controlled and no central authority that makes decisions for everyone.



Security

Blockchain networks utilise decentralisation, cryptography, financial incentives and other mechanisms to ensure high levels of network security.



Transparency

Every transaction made in a Blockchain Network is publicly visible, ensuring there are no “hidden moves” and a clear trail.

Basic Features of a Blockchain Network



Anonymity

Users of Blockchain Networks are pseudonymous, and there is often no way to track a user's real identity.



Trustlessness

The system is built in such a way that it protects its users, even if other users act “badly”. Therefore, there is no need to trust each other.

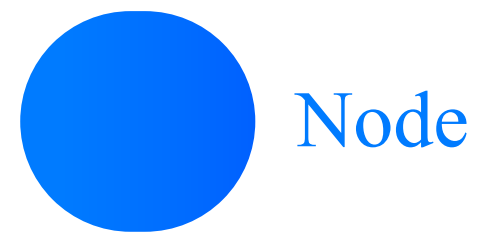


Immutability

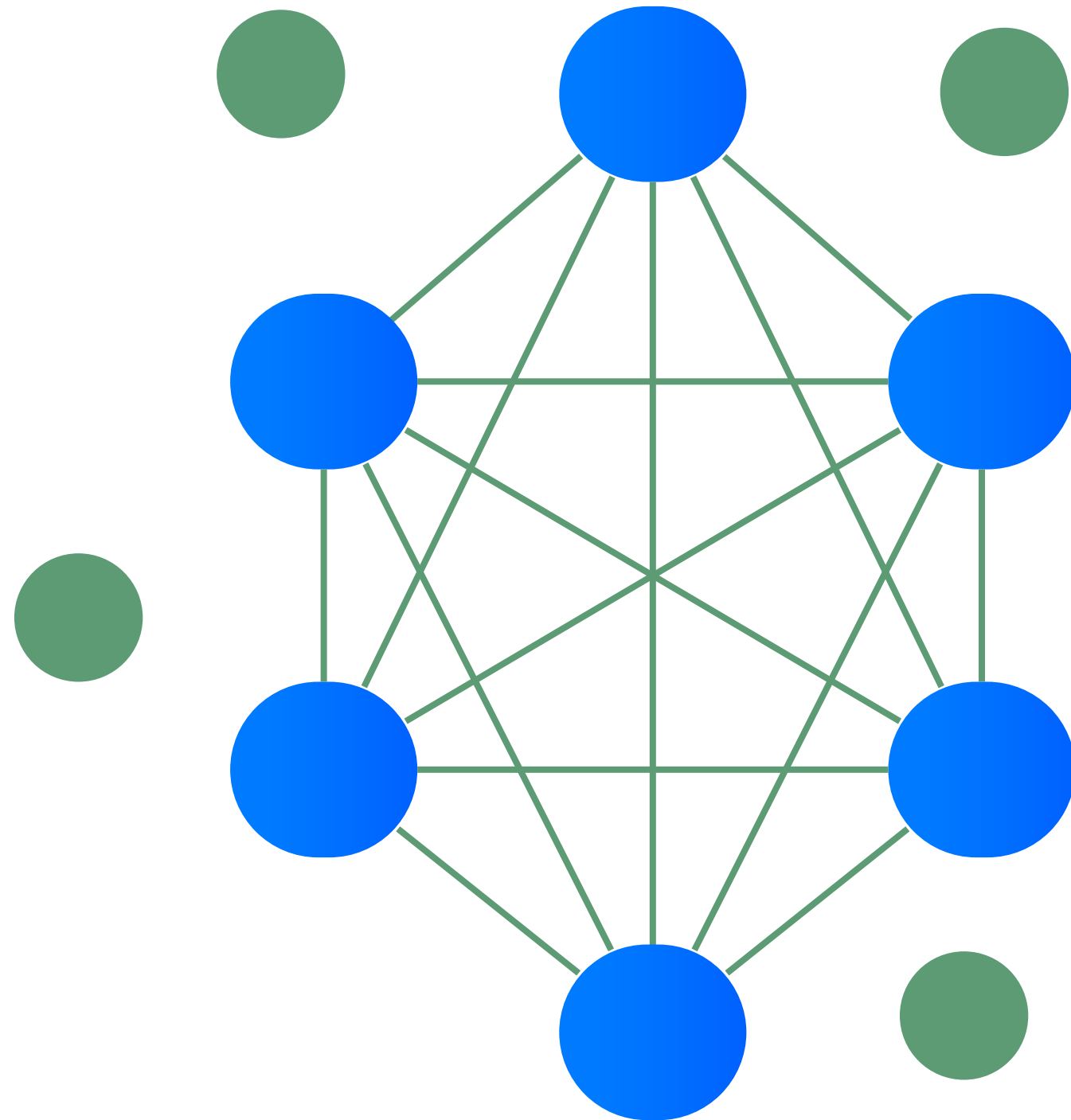
Thanks to the links between the blocks that form the blockchain, and decentralised data storage, data that has already been stored cannot be changed or erased.



User



Node



Basic Blockchain Workflow



1 User sends **Transaction**

2 **Node** receives it, **validates**, shares it.

3 **Transaction** is added to new **Block**.

4 New **Block** is **validated** through **consensus**.

5 New **Block** is added to the **blockchain**.

Additional Resources

Part	Title	Type	Duration	Link	Description
5.1	What Is a Blockchain, and How Does It Work?	Article	15 mins	https://www.dummies.com/article/business-careers-money/personal-finance/cryptocurrency/what-is-a-blockchain-and-how-does-it-work-262432/	A short article explaining basic principles and functionalities of a blockchain network, going slightly into more technical details.
5.1	BLOCKCHAIN TECHNOLOGY: A Beginner's Guide	Video	10 mins	https://www.youtube.com/watch?v=SAJ1YwUgbg	A short video going over the basic elements, application and challenges in Blockchain Technology

References

BLOCKCHAIN FOR BEGINNERS STUDY GUIDE by Blockchain Council

<https://www.blockchain-council.org/wp-content/uploads/2020/02/Blockchain-For-Beginners-Study-Guide-1.pdf>

What is Blockchain by Blockchain Training Alliance

<https://www.buffalo.edu/content/dam/www/ubblockchain/files/basics/001%20What%20is%20Blockchain.pdf>

Blockchain 101 by Bashir, Imran. Mastering Blockchain : Distributed Ledger Technology, Decentralization, and Smart Contracts Explained, 2nd Edition, Packt Publishing

https://eclass.aegean.gr/modules/document/file.php/211107/Mastering_Blockchain_Distributed_Ledger_Technology-%28Chapter_1_Blockchain_101%29%20%281%29.pdf

Blockchain for Beginners-Basic Guiding Principles by EUBlockchain Observatory and Forum

https://blockchain-observatory.ec.europa.eu/document/download/1063effa-59cc-4df4-aece-d2cf94f69178_en?filename=Blockchain_For_Beginners_A_EUBOF_Guide.pdf



You have completed the theoretical part of Module 5 Unit 1



Co-funded by the
Erasmus+ Programme
of European Union

Co-Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.
Project No: 2024-1-SK01-KA220-ADU-000253202