H9BCC: Blockchain Concepts and Technologies

Module Code:	H9BCC
Long Title	Blockchain Concepts and Technologies APPROVED
Title	Blockchain Concepts and Technologies
Module Level:	LEVEL 9
EQF Level:	7
EHEA Level:	Second Cycle
Credits:	5
Module Coordinator:	Horacio Gonzalez-Velez
Module Author:	Sean Heeney
Departments:	School of Computing
Specifications of the qualifications and experience required of staff	Msc degree in Computer Science. Experience Lecturing , work experience or projects in the specific domain

Learning Outcomes

On successful completion of this module the learner will be able to:

#	Learning Outcome Description
LO1	Investigate Blockchain Technologies, Core Components and current state-of-the-art use cases while Demonstrating a concise understanding of Blockchain and DLT technologies with corresponding impacts on existing processes and industries
LO2	Distinguish the variations in protocols, challenges and ongoing disruptive nature of Blockchain and DLT Technologies, including ethical issues and adoption.
LO3	Compose and build a blockchain based application while critically evaluating blockchain applications the value and importance of the Blockchain and Cloud Computing Paradigm ensuring coverage of current use cases and future implementations

Dependencies

Module Recommendations

No recommendations listed

Co-requisite Modules

No Co-requisite modules listed

Entry requirements	Internal to the programme

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Module Content & Assessment

Indicative Content
Foundations of Blockchain Technologies The History of Blockchain and Cryptocurrencies Types of Blockchain Blockchain Stack and Core Components
Blockchain Whitepapers & Literature Foundational Academic Works - White Papers (BTC/ETH...)
Blockchain Management Decentralization Consensus Mechanisms DLT - Distributed Ledger Technology Storing and Using Cryptocurrencies Mining Brewer's CAP
Implementations Existing and Emerging Use Cases Evolution Thus Far (BitCoin/HyperLedger/Ethereum/Monero/Tor)
Security, Identity & Cryptography in Blockchain Into to Cryptography Confidentiality, Integrity & Authentication Merkle , Back, Chaum & CypherPunks
Security Measures in Blockchain Symmetric & Asymmetric Non-Repudiation Public & Private Keys Secure Hashing Algorithm - Hash Functions Digital Signatures vs Anonymity
Blockchain Applications Bitcoin : Overview of Bitcoin System Transactions / P2P Network / Blocks Ethereum : Overview of Ethereum System EVM / Smart Contracts / DevOps / DApps
Development Development of a DApp - Tools Blockchain API's
DevOps The Blockchain Model for DevOps BC & DApps - Integrating with the Cloud
Cloud Computing & Blockchain The BlockCloud Understanding the Paradigm Current Use Cases Real World implementations
Applications, Use Cases, Business and Legal Aspects Cryptourbanomics - The Use of Blockchain in Urban Development Economy & Business Legal Aspects within the Public Sector Ethics in Blockchain and DLT Technologies
Trends & Future Institutional Initiatives for Blockchain The Future for Blockchain

Assessment Breakdown	%
Coursework	50.00%
End of Module Assessment	50.00%

Assessments

Full Time

Coursework

Assessment Type:	Project	**% of total:**	50
Assessment Date:	n/a	**Outcome addressed:**	3
Non-Marked:	No		

Assessment Description:
Develop a working DApp - Blockchain - Suitable APi's - DB / Cloud Services - Web Dev Web3 / Java etc

End of Module Assessment

Assessment Type:	Terminal Exam	**% of total:**	50
Assessment Date:	End-of-Semester	**Outcome addressed:**	1,2
Non-Marked:	No		

Assessment Description:
n/a

No Workplace Assessment

Reassessment Requirement

Repeat failed items
The student must repeat any item failed

Reassessment Description
Reassessment of Project - Cohort must develop a POC inline with project description and requirements

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Module Workload

Module Target Workload Hours 0 Hours

Workload: Full Time

Workload Type	*Workload Description*	*Hours*	*Frequency*	*Average Weekly Learner Workload*
Lecture	No Description	24	Per Semester	2.00
Practical	No Description	24	Per Semester	2.00
Independent Learning	No Description	77	Per Semester	6.42
			Total Weekly Contact Hours	4.00

Module Resources

Recommended Book Resources

Imran Bashir. Mastering Blockchain, [ISBN: 9781788839044].

Andreas M. Antonopoulos. (2016), Mastering Bitcoin, O'Reilly Media, p.330, [ISBN: 9781491954386].

Andreas M. Antonopoulos,Gavin Wood. (2018), Mastering Ethereum, O'Reilly Media, p.384, [ISBN: 9781491971949].

Igor Pejic. (2019), Blockchain Babel, Kogan Page, p.288, [ISBN: 9780749484163].

Daniel Drescher. (2017), Blockchain Basics, Apress, p.255, [ISBN: 9781484226032].

Recommended Article/Paper Resources

Bitcoin White Paper. Bitcoin: A Peer-to-Peer Electronic Cash System,
https://bitcoin.org/bitcoin.pdf

Ethereum White Paper Buterin, V. Ethereum White Paper: A next-generation smart contract and decentralized application platform,
https://github.com/ethereum/wiki/wiki/Wh ite-Paper

Supplementary Article/Paper Resources

Dr. Adam Back. (1997), Hashcash,
http://www.hashcash.org/papers/announce. txt

Eric Hughes. (1993), A Cypherpunk's Manifesto,
https://www.activism.net/cypherpunk/mani festo.html

Wei Dai. B-Money,
http://www.weidai.com/bmoney.txt

Hal Finney. (2004), Reuseable PoW,
https://cryptome.org/rpow.htm

Other Resources

[Website], Blockchain WhitePapers Notes,
https://hackernoon.com/whitepaper-in-fou r-minutes-ripple-a27103e4d265

[Website], Coinbase,
https://www.coinbase.com/

[Website], Coindesk,
https://www.coindesk.com/

[Website], IBM Hyperledger,
https://www.ibm.com/blockchain/hyperledg er

[Website], Metamask,
https://metamask.io/

[Website], Etherscan,
https://etherscan.io/

[Website], Ethereum,
https://www.ethereum.org/

Discussion Note:	