

## H9BCC: Blockchain Concepts and Technologies

<b>Module Code:</b>	H9BCC
<b>Long Title</b>	Blockchain Concepts and Technologies <b>APPROVED</b>
<b>Title</b>	Blockchain Concepts and Technologies
<b>Module Level:</b>	LEVEL 9
<b>EQF Level:</b>	7
<b>EHEA Level:</b>	Second Cycle
<b>Credits:</b>	5
<b>Module Coordinator:</b>	Horacio Gonzalez-Velez
<b>Module Author:</b>	Sean Heeney
<b>Departments:</b>	School of Computing
<b>Specifications of the qualifications and experience required of staff</b>	Msc degree in Computer Science. Experience Lecturing , work experience or projects in the specific domain
<b>Learning Outcomes</b>	
<i>On successful completion of this module the learner will be able to:</i>	
<b>#</b>	<b>Learning Outcome Description</b>
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
<b>Dependencies</b>	
<b>Module Recommendations</b>	
No recommendations listed	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Entry requirements</b>	Internal to the programme

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Module Content & Assessment			
<b>Indicative Content</b>			
<b>Foundations of Blockchain Technologies</b> The History of Blockchain and Cryptocurrencies Types of Blockchain Blockchain Stack and Core Components			
<b>Blockchain Whitepapers &amp; Literature</b> Foundational Academic Works - White Papers (BTC/ETH...)			
<b>Blockchain Management</b> Decentralization Consensus Mechanisms DLT - Distributed Ledger Technology Storing and Using Cryptocurrencies Mining Brewer's CAP			
<b>Implementations</b> Existing and Emerging Use Cases Evolution Thus Far (BitCoin/HyperLedger/Ethereum/Monero/Tor)			
<b>Security, Identity &amp; Cryptography in Blockchain</b> Intro to Cryptography Confidentiality, Integrity & Authentication Merkle , Back, Chaum & CypherPunks			
<b>Security Measures in Blockchain</b> Symmetric & Asymmetric Non-Repudiation Public & Private Keys Secure Hashing Algorithm - Hash Functions Digital Signatures vs Anonymity			
<b>Blockchain Applications</b> Bitcoin : Overview of Bitcoin System Transactions / P2P Network / Blocks Ethereum : Overview of Ethereum System EVM / Smart Contracts / DevOps / DApps			
<b>Development</b> Development of a DApp - Tools Blockchain API's			
<b>DevOps</b> The Blockchain Model for DevOps BC & DApps - Integrating with the Cloud			
<b>Cloud Computing &amp; Blockchain</b> The BlockCloud Understanding the Paradigm Current Use Cases Real World implementations			
<b>Applications, Use Cases, Business and Legal Aspects</b> Cryptourbanomics - The Use of Blockchain in Urban Development Economy & Business Legal Aspects within the Public Sector Ethics in Blockchain and DLT Technologies			
<b>Trends &amp; Future</b> Institutional Initiatives for Blockchain The Future for Blockchain			
<b>Assessment Breakdown</b>			<b>%</b>
Coursework			50.00%
End of Module Assessment			50.00%
<b>Assessments</b>			
<b>Full Time</b>			
<b>Coursework</b>			
<b>Assessment Type:</b>	Project	<b>% of total:</b>	50
<b>Assessment Date:</b>	n/a	<b>Outcome addressed:</b>	3
<b>Non-Marked:</b>	No		
<b>Assessment Description:</b> Develop a working DApp - Blockchain - Suitable API's - DB / Cloud Services - Web Dev Web3 / Java etc			
<b>End of Module Assessment</b>			
<b>Assessment Type:</b>	Terminal Exam	<b>% of total:</b>	50
<b>Assessment Date:</b>	End-of-Semester	<b>Outcome addressed:</b>	1,2
<b>Non-Marked:</b>	No		
<b>Assessment Description:</b> n/a			
No Workplace Assessment			
<b>Reassessment Requirement</b>			
<b>Repeat failed items</b> <i>The student must repeat any item failed</i>			
<b>Reassessment Description</b> 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	
<i>Recommended Book Resources</i>	
<p>Imran Bashir. Mastering Blockchain, [ISBN: 9781788839044].</p> <p>Andreas M. Antonopoulos. (2016), Mastering Bitcoin, O'Reilly Media, p.330, [ISBN: 9781491954386].</p> <p>Andreas M. Antonopoulos, Gavin Wood. (2018), Mastering Ethereum, O'Reilly Media, p.384, [ISBN: 9781491971949].</p> <p>Igor Pejic. (2019), Blockchain Babel, Kogan Page, p.288, [ISBN: 9780749484163].</p> <p>Daniel Drescher. (2017), Blockchain Basics, Apress, p.255, [ISBN: 9781484226032].</p>	
<i>Recommended Article/Paper Resources</i>	
<p>Bitcoin White Paper. Bitcoin: A Peer-to-Peer Electronic Cash System,  <a href="https://bitcoin.org/bitcoin.pdf">https://bitcoin.org/bitcoin.pdf</a></p> <p>Ethereum White Paper Buterin, V. Ethereum White Paper: A next-generation smart contract and decentralized application platform,  <a href="https://github.com/ethereum/wiki/wiki/White-Paper">https://github.com/ethereum/wiki/wiki/White-Paper</a></p>	
<i>Supplementary Article/Paper Resources</i>	
<p>Dr. Adam Back. (1997), Hashcash,  <a href="http://www.hashcash.org/papers/announce.txt">http://www.hashcash.org/papers/announce.txt</a></p> <p>Eric Hughes. (1993), A Cypherpunk's Manifesto,  <a href="https://www.activism.net/cypherpunk/manifesto.html">https://www.activism.net/cypherpunk/manifesto.html</a></p> <p>Wei Dai. B-Money,  <a href="http://www.weidai.com/bmoney.txt">http://www.weidai.com/bmoney.txt</a></p> <p>Hal Finney. (2004), Reuseable PoW,  <a href="https://cryptome.org/rpow.htm">https://cryptome.org/rpow.htm</a></p>	
<i>Other Resources</i>	
<p>[Website], Blockchain WhitePapers Notes,  <a href="https://hackernoon.com/whitepaper-in-four-minutes-ripple-a27103e4d265">https://hackernoon.com/whitepaper-in-four-minutes-ripple-a27103e4d265</a></p> <p>[Website], Coinbase,  <a href="https://www.coinbase.com/">https://www.coinbase.com/</a></p> <p>[Website], Coindesk,  <a href="https://www.coindesk.com/">https://www.coindesk.com/</a></p> <p>[Website], IBM Hyperledger,  <a href="https://www.ibm.com/blockchain/hyperledger">https://www.ibm.com/blockchain/hyperledger</a></p> <p>[Website], Metamask,  <a href="https://metamask.io/">https://metamask.io/</a></p> <p>[Website], Etherscan,  <a href="https://etherscan.io/">https://etherscan.io/</a></p> <p>[Website], Ethereum,  <a href="https://www.ethereum.org/">https://www.ethereum.org/</a></p>	
Discussion Note:	