



Approved by Chair:

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Signature

COURSE SECTION INFORMATION

dApp I
T175 Blockchain Development

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Out of Class Assistance

Course Code: BCDV1012

Course Section

Academic Year: 2020-2021

Term: Winter 2021

LIST OF TEXTBOOKS AND OTHER TEACHING AIDS:

Required: N/A

Recommended Resources: N/A

Detailed Evaluation System

Assessment Tool:	Description:	Outcome(s) assessed:	EES assessed:	Date / Week:	% of Final Grade:
Participation	Attendance and participation in class	1, 2, 3, 4, 5, 6, 7	2,4,5,6, 7,10,11	1-3	10
Lab Exercises 10 @ 3% (Best 10 out of 14)	Hands-On Exercise	1, 2, 3, 4, 5, 6, 7	2,4,5,6, 7,10,11	1-3	30
Assignment	Individual Assignment	1, 2, 3, 4, 5, 6, 7	1,2,4,5,6,7,8,9, 10,11	3	30
Final Exam	Short Answer Exam	1, 2, 3, 4, 5, 6, 7	1,2,4,5,6,7,8,9, 10,11	3	30
TOTAL:					100%

TOPICAL OUTLINE:

Week	Topic Task	Outcome(s)	Content / Activities	Resources
1	1	1, 2	<ul style="list-style-type: none"> Thorough overview of centralised, hybrid and decentralised application models. Case study examples of the current landscape of decentralised applications. Lab Exercise 1: Form groups and work from a list of use cases and identify the best application model fit and explain why. 	Resource material available on Blackboard
1	2	1, 2, 3, 4	<ul style="list-style-type: none"> In depth study and analysis of current decentralised application landscape. Overview of available dApp development environments Ethereum, EOS.IO, Fabric, Stellar Examples of web and native mobile dApps Lab Exercise 2: Form groups and pick a dApp example and discuss how it would be different in the dApp environments. 	Resource material available on Blackboard
1	3	1,6	<ul style="list-style-type: none"> Introduction to Hyperledger Fabric Overview of the nodes that comprise a Fabric network Exploration of the settings for a network Lab Exercise 3: Install a basic Hyperledger Fabric network 	Resource material available on Blackboard
	4	1,6	<ul style="list-style-type: none"> Introduction to Chaincode on Fabric Using the fabric-contract-api, fabric-shim modules to build chaincode Using putState, getState and composite keys to store and retrieve state data Using the peer command to install, instantiate and invoke chaincode Lab Exercise 4: Write chaincode to store and retrieve JSON data and install on your basic network 	Resource material available on Blackboard
1	5	1,6	<ul style="list-style-type: none"> Introduction to the Fabric-sdk-node Using the wallet and client interface to register, enroll and revoke users Using gateways, networks and contracts to call chaincode The difference between evaluating and submitting transactions Lab Exercise 5: create a local wallet and use the Fabric SDK to call your chaincode on your basic network from a web interface 	Resource material available on Blackboard

Tasks: Lab Exercises: 1, 2, 3, 4, 5				
2	6	1, 4, 6	<ul style="list-style-type: none"> Using peer nodes for enterprise decentralized applications Organizations and membership services provider Using private data for confidential transactions Adding and removing peer nodes Lab exercise 6: Add a second and third peer node to your network each with a different organization. Join the new peers to the channel and endorse them for the chaincode 	Resource material available on Blackboard
2	7	1, 4, 6	<ul style="list-style-type: none"> Understanding persistent storage using CouchDB Querying the CouchDB database using JSON query language Adding indexes to CouchDB Using the CouchDB web interface for reviewing state data Private Data Collections Debugging using docker logs to debug issues Lab exercise 7: Write JSON data to CouchDB and query the data. Speed it up with indexes. 	Resource material available on Blackboard
2	8	1, 4, 5, 6	<ul style="list-style-type: none"> Using a state machine to model workflow use cases Designing chaincode to work with state machines Displaying and transitioning states from a web application Lab exercise 8: Create chaincode and web dApp to represent an enterprise workflow 	Resource material available on Blackboard
2	9	1,2,3,4,5	<ul style="list-style-type: none"> Identifying enterprise decentralized use cases Survey of decentralized systems for supply chain, government registries and B2B marketplaces Designing decentralized blockchain systems using the elements of Fabric Lab exercise 9: Break into groups and take a use case and design a system. 	Resource material available on Blackboard
2	10	1,2,3,4,5,6	<ul style="list-style-type: none"> Enterprise considerations for wallet and private key usage Setting roles for users in the MSP Creating digital signatures using the wallet Limiting access to data using channels, organizations, roles and users Lab exercise 10: Build your decentralized application from your use case. 	Resource material available on Blackboard
Tasks: Lab Exercises: 6, 7, 8, 9, 10				

3	11	1,6	<ul style="list-style-type: none"> Enforcing security best practices on Fabric Cloud storage architectures for Hyperledger Fabric networks Rebuilding a peer node Lab exercise 11: Add better security to your decentralized application and network. Create a cloud hosting diagram for your system. Kill a peer node and rebuild it. 	Resource material available on Blackboard
3	12	1,6	<ul style="list-style-type: none"> Automated testing techniques for Fabric Load analysis to estimate handling scaling Peer discovery service Peer channel-based event services Lab exercise 12: Create a spreadsheet and model the resource requirements for each peer node. Add in automated testing for each chaincode contract and invoke call. 	Resource material available on Blackboard
3	13	2,5	<ul style="list-style-type: none"> Governance models of decentralized systems Examples of governance DAO, SSI frameworks, TradeLens Using consortiums, industry organizations and voting models Lab exercise 13: create a governance model for your application. 	Resource material available on Blackboard
3	14	1,2,5	<ul style="list-style-type: none"> Documentation for decentralized systems Tools, formats and document types Lab exercise 14: create the documentation for you application 	Resource material available on Blackboard
<p style="text-align: right;">Tasks: Lab Exercises: 11, 12, 13, 14</p>				
3	15	1,2,3,4,5,6	<p style="text-align: center;">Assignment due Final Exam</p>	Resource material available on Blackboard