CubeSat Flight Software Workshop Agenda
Day 1 - Monday, June 3, 2019

Type	Topic/Activity	Presenter	Time	Duration
Workshop check in			8:00	25
Introduction		J. Levison	8:25	5
Presentation	01 Spacecraft Archtecture and System Overview	T. Canham	8:30	60
Presentation	02 FSW System Engineering - Capability Layers	T. Canham	9:30	60
	Drivers			
	Services			
	Applications			
Break			10:30	15
Presentation	03 FSW Architecture Principles	G. Watney	10:45	60
	Modularity (clear separation)			
	State machines			
	Restricted use of dynamic memory allocation			
	Rate groups vs. background tasks			
	Other design principles			
Lunch			11:45	60
Presentation	04 F' Introduction	T. Canham	12:45	60
Presentation	05 FSW Development Process	A. Rizvi	1:45	60
	FSW level process - waterfall model, artifacts, reviews			
	Component level process - checklists, reviews			
	FSW planning and reporting			
Break			2:45	15
Exercise	06 Lab project system requirements	T. Canham	3:00	30
	06 Lab project component breakdown	T. Canham	3:30	30
Homework	Lab project kit mechanical assembly and F' demo on Raspberry Pi	T. Canham	4:00	

Day 2 - Tuesday, June 4, 2019				
Type	**Topic/Activity**	**Presenter**	**Time**	**Duration**
Presentation	07 FSW Design	M. Starch	8:30	90
	FSW system modeling in F' (Types, ports, components, topology definitions)			
	Data types, interfaces			
	Commands, telemetry events, parameters and data products			
	Concurrency, initialization, memory allocation			
	OS abstraction layer (message queues, mutex, tasks, file system)			
	Interface design patterns			
	Serializing and deserializing data			
Break			10:00	15
Exercise	Write F' component and XML implementations for lab project	M. Starch	10:15	90
	FSW Implementation in F'			
	Component level implementation			
	Filling in component handlers			
	Sending telemetry, events			
	Using parameter values			
	Directly invoking ports			
	Deployment level implementation			
Lunch			11:45	60
	08 Reducing risk	G. Holzmann	12:45	45
	Defensive coding			
	Avoiding C and C++ pitfalls			
	Static analysis			
	09 Suggestions for Coding Style	R. Bocchino	1:30	45
	Modules and Components			
	Functions			
	Expressions and Statements			
Break			2:15	15
Exercise	Implement components and topology for lab project	T. Canham	2:30	90
Homework	Finish Lab implementation	T. Canham	4:00	

Day 3 - Wednesday, June 5, 2019				
Type	**Topic/Activity**	**Presenter**	**Time**	**Duration**
	10 Basic data structures	R. Bocchino	8:30	30
	Implementation			
	When to choose which one			
Presentation	11 Unit Testing	R. Bocchino	9:00	30
	Basic principles of testing			
	Writing modular tests			
	Achieving and checking code coverage			
	Picking good inputs			
Break			9:30	15
	12 F' unit test framework	R. Bocchino	9:45	30
Exercise	Writing unit tests for lab project	R. Bocchino	10:15	60
Presentation	13 Ground System	L. Reder	11:15	60
	F' GDS overview			
	Radio adaptations			
	Dictionaries			
	Storage			
Lunch			12:15	60
Exercise	Lab assignment system testing using the GDS	T. Canham	1:15	90
Break			2:45	15
Exercise	Student Demo/Conclusion	T. Canham	3:00	30