

## Schedule for the Advanced Quantum Computing Winter school

Lectures in the morning

Tutorials/Exercises in the afternoon

	Date	Time	Topic	Speaker
<b>Week 1</b>	05-December	9.30 AM to 11.00 AM	Introduction on QIT	Dr.Arul Lakshminarayan
		11.30 AM to 1.00 PM	Quantum Error Correction I	Dr. Prabha Mandyam
		2.00 AM to 5.00 PM	Introduction to Qiskit; Recap gates, circuits	Nilesh Sharma
	06-December	9.30 AM to 11.00 AM	QFT, QPE, Application to Shor	Dr. Dhiraj Madan
		11.30 AM to 1.00 PM	Grover, QAA, QAE	Dr. Dhiraj Madan
		2.00 PM to 5.00 PM	QFT, QPE tutorials; Grover exercises	Varad Pande
	07-December	9.30 AM to 11.00 AM	HHL	Dr. Dhiraj Madan
		11.30 AM to 1.00 PM	Quantum Error Correction II	Dr. Prabha Mandyam
		2.00 PM to 5.00 PM	Try out matrix algorithms; Implement simple codes	Valliamai R
	08-December	9.30 AM to 11.00 AM	VQE	Dr. YSRK Chaitanya
		11.30 AM to 1.00 PM	Quantum Optimization	Dr. Anil Prabhakar
		2.00 PM to 3.30 PM	Understanding quantum advantage Part 1: Spectral methods and concentration.	Dr. Krishna Palem
		3.30 PM to 5.00 PM	Exercise on calculating expectation values through VQE?	Kalpaka and Sumit
	09-December	9.30 AM to 11.00 AM	Understanding quantum advantage Part 2: Computational complexity.	Dr. Krishna Palem
		11.30 AM to 1.00 PM	Quantum Error Mitigation	Dr. Dhinakaran V
		2.00 PM to 3.30 PM	Pick two optimization use-cases to solve using discussed algorithms	Sashikala Sakunthala
		3.30 PM to 5.00 PM	QEM tutorial: run DD, ZNE, PEC over simple circuit and over an application (VQE?)	Debjyoti and Valliamai R

<b>Week 2</b>	12-December	9.30 AM to 11.00 AM	Quantum Metrology I	Dr. Vaibhav Madhok
		11.30 AM to 1.00 PM	Quantum Metrology II	Dr. Vaibhav Madhok
		2.00 PM to 5.00 PM	Intro to Qiskit Runtime	Kalpak and Sumit
	13-December	9.30 AM to 11.00 AM	Quantum Machine Learning I	Dr. Anupama Ray
		11.30 AM to 1.00 PM	Quantum Machine Learning II	Dr. Anupama Ray
		2.00 PM to 5.00 PM	Tutorial on classification problems; SVM demos; Graph networks demos	Sashikala Sakunthala
	14-December	9.30 AM to 11.00 AM	Applications to Finance	Dr. Dhinakaran V
		11.30 AM to 1.00 PM	Nature Simulations	Dr. Kalyan Dasgupta
		2.00 PM to 5.00 PM	Tutorial on amplitude estimation, and ML applications to finance; Tutorial on molecular simulations	Kalpak and Sumit
	15-December	9.30 AM to 11.00 AM	Transpilation: basics, optimization levels, circuit knitting/entanglement forging	Dr. Sheshashayee Raghunathan
		11.30 AM to 1.00 PM	Quantum-safe and quantum cryptography	Dr. Dhinakaran V
		2.00 PM to 5.00 PM	Demonstrate optimization levels for circuits; error mitigation levels; QKD demo	Nilesh Sharma
	16-December	9.30 AM to 11.00 AM	Hardware basics	Dr. Nicolas Gheeraert
		11.30 AM to 1.00 PM	Pulse programming	Dr. Kalyan Dasgupta
		2.00 PM to 5.00 PM	Pulse programming. Discussion on the next steps on learning and using quantum computing. Panel discussion	Ashutosh (Pulse Programming); Dr. Anil Prabhakar: Panel discussion