

1.	Title of the course	Quantum Computer Systems
2.	Course number	CS544L
3.	Structure of credits (L-T-P-C)	3-0-0-3
4.	New course/modification to	New
5.	To be offered by	Computer Science and Engineering
6.	Proposed by	Raghavendra K
7.	Prerequisite	None
8.	Course Objective(s): To introduce the fundamental concepts of quantum computer systems and the computational models that drive quantum systems. To discuss the challenges and solutions in quantum system optimization and error management.	
9.	Course Content: Basics in quantum computing: review of linear algebra, qubits, quantum gates, measurements, noisy quantum systems; Basic quantum algorithms; Models of quantum computation: gate based models, measurement based models; Computation architecture: classical and quantum processing unit; Quantum programming languages; Circuit synthesis and compilation: synthesizing quantum circuits, quantum compiler optimization, gate scheduling and parallelism; Quantum control theory; Noise mitigation and error correction: quantification of realistic noise, noise mitigation techniques.	
10.	Textbook(s): 1. Ding Y and Chong F T, Quantum Computer Systems: Research for Noisy Intermediate-Scale Quantum Computers, Morgan & Claypool Publishers (2020). 2. Nielsen M A and Chuang I L, Quantum Computation and Quantum Information, 10th Anniversary Edition, Cambridge University Press (2010).	
11.	Reference(s): 1. Kaye P, Laflamme R and Mosca M, An Introduction to Quantum Computing, Oxford University Press (2007). 2. Aaronson S, Quantum Computing since Democritus, Cambridge University Press (2013).	