

Semester	AUG 2023
Open to semester	13,21
Course code	DS6152/PH6582
Course title	Quantum Machine Learning
Credits	/2
Course Coordinator & participating faculty (if any)	M. S. Santhanam
Nature of Course	Lectures
Pre-requisites	Quantum Mechanics I and II. Desirable to have taken Quantum Information course as well.
Objectives (goals, type of students for whom useful, outcome etc)	To learn the basic tools and techniques in the emerging area of quantum machine learning. This is primarily meant for Ph.D students.
Course contents (details of topics /sections with no. of lectures for each)	1) Introductory ideas about quantum machine learning (QML) (1) 2) Machine learning basics and overview of some techniques (1) 3) Representing data on a quantum computer (1) 4) Quantum k-means and perceptrons (2) 5) Parameterised (variational) quantum circuits (5) 6) HHL algorithm, qPCA and qSVM (3) 7) Kernel based approaches to QML (3) 8) Quantum walk based techniques (1)
Evaluation /assessment	End-Sem Examination-40% Mid-Sem Examination-% Others-Assessment will be based on paper presentation (60%)%
Suggested readings (with full list of authors, publisher, year, edn etc.)	1) Machine Learning with Quantum Computers Maria Schuld, Francesco Petruccione (Springer, 2021) https://link.springer.com/book/10.1007/978-3-030-83098-4 2) Quantum machine learning Nature, 549, pages 195–202 (2017) 3) A non-review of Quantum Machine Learning: trends and explorations Vedran Dunjko and Peter Wittek

	Quantum Views 4, 32 (2020)
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	4) Quantum machine learning: from physics to software engineering
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	A. Melnikov et. al,
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	Advances in Physics: X, vol 8, page 2165452, (2023).
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