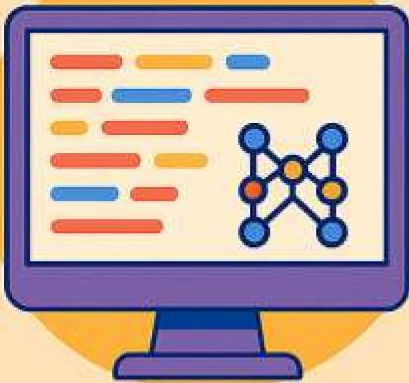




SHARDA
UNIVERSITY
Beyond Boundaries



**SHARDA SCHOOL OF
COMPUTING SCIENCE
& ENGINEERING**



COURSE
**Quantum Computing
with Artificial
Intelligence
(NV62010)**

VALUE ADDED
Course Brochure
2026-27

ABOUT THE UNIVERSITY

Sharda University envisions serving society by being a global University of higher learning in pursuit of academic excellence, innovation, and nurturing entrepreneurship. It has 13,000+ students from 95+ countries, 29 states, and Union Territories, providing cultural diversity and global exposure to students. It has 26000+ alumni who are today leaders in their realms. Sharda University is a NAAC A+ University with an Overall NIRF Rank of 86. The Teaching Learning Center at Sharda University is to equip the faculty members with the expertise, skills, and knowledge they need for capacity building of students. Teaching as a profession requires highly specialized skills and knowledge to have a significant impact on student learning; therefore, teachers must continually refine their conceptual and pedagogical skills.

ABOUT SCHOOL

Sharda School of Computing Science & Engineering is an open platform for diverse voices where teaching runs parallel to the real world, and students are groomed to join the global workforce. SSCSE is distinguished as one of the top-ranked engineering schools in India. The students at SSCSE benefit from the professional grooming of renowned faculty and industry experts who have experience in tackling pressing engineering problems. Students discover their passion in one of the various offered Engineering majors at the Sharda School of Computing Science & Engineering. A student-centric pedagogy, project-based approach, and design-driven curriculum provide students with an inclination for complex problem-solving, design, innovation, and a passion for learning.

ABOUT DEPARTMENT

The Department of Computer Science & Engineering strives to equip faculty and students with all the computing resources needed to address a wide range of scientific, technological, and socially complex problems. The department imparts technical education for designing quirky technological applications and innovations. The department aims to become a center of excellence and impart knowledge to intellectual professionals so as to equip them with the requisite skills as per Industry standards. The department aims to foster an innovative research environment by providing a supportive, amiable, and challenge-based learning culture. The department utilizes high-performance computing equipment and facilities to impart state-of-the-art technical knowledge to students and instill a desire to pursue lifelong learning. To emerge as a world-class department, we focus on innovative research and quality learning in computer science applications that prepare entrepreneurs and professionals to lead the social, economic, and technical development of society. The Value Added Education Courses aim to provide additional learner-centric graded skill-oriented training, with the primary objective of improving the employability skills of students.

VALUE ADDED COURSE (VAC)

The Value Added Courses aim to provide additional learner-centric graded skill-oriented training, with the primary objective of improving the employability skills of students.

PURPOSE OF VALUE ADDED COURSE

VACs are pertinent instructional strategies designed to close knowledge gaps in students and provide them a competitive edge in the job market. The courses' well-defined structure makes these VACs highly effective in enhancing students' employability quotient by developing diverse competencies. They help students lay the creative groundwork for passion projects (such as interactive dashboards, business analytics, or sector-specific visual reports) beyond their core academic curriculum, offering skills that can transform their enthusiasm into career opportunities.

RESOURCE PERSONS

Dr. Dharm Raj

Dr. Dharm Raj is an Educator, Researcher, and Academic Leader with over 20 years of experience in higher education, research, academic administration, and institutional development. He holds a Ph.D. in Computer Science & Engineering from Sharda University, an M.Tech. from IIIT Allahabad, and a B.Tech. in Computer Science & Engineering. His expertise spans curriculum development, accreditation (NAAC & NBA), examination reforms, academic governance, and quality assurance. He has published over 50 research papers, holds 11 patents, and is a Senior Member of IEEE, Life Member of CSI, and ACM Member. His interests include research, innovation, mentorship, and technology-enabled education.

Mr. Ketan Anand

Mr. Ketan Anand is an Assistant Professor in the Department of Computer Science and Engineering at Sharda University, Greater Noida, with over 11 years of teaching experience. He is currently pursuing his Ph.D. at Dr. B. R. Ambedkar National Institute of Technology (NIT) Jalandhar. His research interests include artificial intelligence, machine learning, deep learning, quantum computing, medical image analysis, neuroimaging, federated learning, and optimization algorithms. He has authored several research papers in reputed international journals and conferences. He is passionate about teaching, research, curriculum development, interdisciplinary collaboration, and mentoring students to solve real-world challenges through innovative computing technologies.

Mr. Kanamala Suresh

Mr. Kanamala Suresh is working Assistant Professor in the Department of Computer Science and Engineering, SSCSE, Sharda University, UP, India. He has 11+ years of experience in teaching and 4+ years of experience in Research. He has completed his B.Tech(CSE) and M.Tech from JNTU Hyderabad. He is pursuing his P.hD. from National Institute of Technology, Warangal, Telangana, India. Served for NAB, NAAC, and Autonomous Accreditations at various colleges during the services. He has designed syllabus and curriculum and structure for Autonomous B. Tech –CSE and guided 30+ B.Tech projects and 15+ M.Tech projects in various domains. He has won the Best Faculty Award three times and qualified UGC-NET (Assistant Professor) three times, along with GATE 2024.

Ms. Aliza Rana

Ms. Aliza Rana holds an M.Tech in Computer Science (Data Science) from Sharda University and a Bachelor's degree in Biomedical Engineering. She has over five years of industry experience as a Biomedical Service Engineer, specializing in radiotherapy and brachytherapy systems, and received advanced technical training from BEBIG GmbH, Germany. Her industry experience inspired her to pursue research in Artificial Intelligence for healthcare. Her research interests include AI, Machine Learning, Deep Learning, Data Science, Healthcare Analytics, and Medical Image Analysis. She has presented research on AI-based breast cancer diagnosis at international conferences and is committed to advancing research, innovation, and interdisciplinary learning.

Dr. Akanksha Srivastava

Akanksha Srivastav, an Assistant Professor in the Department of Computer Science and Engineering at Sharda University, with 10 years of teaching experience in higher education. I am currently pursuing a Ph.D. at NIT Kurukshetra, where my research focuses on Software Engineering with Machine Learning. My academic interests include Design and Analysis of Algorithms, Operating Systems, Software Engineering, and Cyber Security. I have published more than 15 conference papers, 1 journal paper, 3 patents, and 2 book chapters. I have also served as a member of the NBA accreditation committee and have organized several value-added courses, workshops, faculty development programs (FDPs), and technical events. I am passionate about student-centric teaching, curriculum development, mentoring, and conducting research that bridges theoretical knowledge with practical, industry-oriented applications.

Dr. Sumit Kumar

Dr. Sumit Kumar is an accomplished academician and researcher currently serving as an Associate Professor in the Department of Computer Science and Engineering at Sharda University, Greater Noida. He earned his Ph.D. in Computer Science and Engineering in 2019 for his research on "Prediction of Students' Performance Using K-Star Algorithm." He also holds an M.Tech. in CSE from BPUT, Rourkela, and a B.Tech. in CSE from KIIT University, Bhubaneswar. With over 15 years of teaching and administrative experience, Dr. Kumar has demonstrated excellence in academics, accreditation, research, and institutional development. His research contributions include 51 publications, comprising papers indexed in Web of Science and Scopus, along with 7 patents (3 published and 4 granted), 2 books, and 2 book chapters. Dr. Kumar has successfully guided 19 M.Tech. scholars and supervised a Ph.D. scholar whose thesis has been submitted. He has also organized international conferences, reflecting his commitment to academic excellence, quality assurance, innovation, and the advancement of future-ready technical education.

COURSE SCHEDULE

Week	Topic	Duration (Hrs.)
1	Introduction to Quantum Computing, Basics of quantum mechanics	3
2	Qubits, superposition, entanglement, Quantum gates and circuits	3
3	Measurement and noise, Quantum Algorithms	3
4	Deutsch-Jozsa Algorithm, Grover's Search Algorithm; Shor's Algorithm (overview)	3
5	Computational complexity	3
6	Quantum AI, Quantum-enhanced image recognition	3
7	Logistics and financial modeling optimization	3
8	Quantum AI challenges, Quantum Machine Learning	3
9	Quantum AI concepts, Variational Quantum Circuits	3
10	Quantum Neural Networks; Hybrid models	3
11	Installation of Qiskit/Cirq, Quantum circuit simulation;	3
12	Implementation of algorithms, Mini project	3
Total		36 hours

School: Sharda School of Computing Science & Engineering, (Department of Computer Science & Engineering)		
Program: B. Tech CSE Semester: VII		
Batch: 2023-27 Current Academic Year: 2026-27		
1. Course Code	NV62010	
2. Course Title	Quantum Computing with Artificial Intelligence	
3. Credits	0	
4. Contact Hours (L-T-P)	30 Hours	
Course Type	Value added course	
5. Course Objective	1. To understand the fundamentals of quantum computing principles. 2. To explore quantum algorithms and their computational advantages. 3. To integrate artificial intelligence techniques with quantum systems. 4. To develop practical skills using quantum programming frameworks. 5. To design hybrid quantum-AI applications.	
6. Course Outcomes	After the completion of this course, students will be able to: CO1: To describe the basic concepts quantum computing and AI. CO2: To understand basic concepts of quantum computing and qubits CO3: To analyze quantum algorithms and their advantages CO4: To apply AI techniques in quantum environments CO5: To implement quantum circuits using tools like Qiskit CO6: To develop hybrid quantum-AI models for real-world problems	
7. Course Description	This course provides a comprehensive foundation in quantum computing principles, explores quantum algorithms and their computational advantages over classical methods, integrates artificial intelligence techniques with quantum systems, develops practical skills using quantum programming frameworks such as Qiskit and Cirq, and equips students with the ability to design innovative hybrid quantum-AI applications for real-world problem-solving.	
8. Outline syllabus		CO Mapping
Unit 1	Introduction to Quantum Computing	
A	Basics of quantum mechanics; Qubits, superposition, entanglement	CO1, CO2
B	Quantum gates and circuits	
C	Measurement and noise	
Unit 2	Quantum Algorithms	
A	Deutsch-Jozsa Algorithm	CO3
B	Grover’s Search Algorithm; Shor’s Algorithm (overview)	
C	Computational complexity	
Unit 3	Quantum AI	
A	Quantum-enhanced image recognition.	CO1, CO4
B	Logistics and financial modeling optimization	
C	Quantum AI challenges	
Unit 4	Quantum Machine Learning	
A	Quantum AI concepts	CO4, CO6
B	Variational Quantum Circuits	
C	Quantum Neural Networks; Hybrid models	
Unit 5	Practical / Lab Work	
A	Installation of Qiskit/Cirq	CO5, CO6
B	Quantum circuit simulation; Implementation of algorithms	
C	Mini Project	
Mode of examination	Jury/Practical/Viva	CA 100%
Reference e-Books	1. M. A. Nielsen and I. L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press. ISBN 978-1-107-00217-3 2. E. Rieffel and W. Polak, Quantum Computing: A Gentle Introduction, MIT Press. ISBN: 9780262526678, 2014 3. Brojo Kishore Mishra, Integration of AI, Quantum Computing, and Semiconductor Technology, ISBN: 9798369370766, 2024	
Other References	1. I. Mahmud, and A. Abdelhadi, "Artificial Intelligence in Quantum Communications: A Comprehensive Survey," IEEE Access, vol. 13, pp. 1-25, 2025. 2. D. Maheshwari, B. Garcia-Zapirain, and D. Sierra-Sosa, "Quantum machine learning applications in the biomedical domain: A systematic review," IEEE Access, vol. 10, pp. 80463-80484, 2022. doi: 10.1109/ACCESS.2022.3197493.	