Mindluster Platform

About the course Cryogenic electronics for Quantum Computing

Course Presenter : IIT Roorkee July 2018

Discover the cutting-edge field of Cryogenic Electronics for Quantum Computing through this comprehensive online training course. Designed for engineering professionals and aspiring quantum technologists in the Middle East, this course offers in-depth knowledge essential for advancing your career in the rapidly evolving landscape of quantum technology. Gain specialized skills in cryogenic electronic systems, crucial for the development and optimization of quantum computers, and stay ahead in the competitive job market. In this professional training course, you will learn: - The fundamentals of cryogenic electronics and their role in quantum computing - Design principles for low-temperature electronic components - Techniques for integrating cryogenic systems with quantum hardware - Troubleshooting and maintenance of cryogenic electronic devices - Best practices for ensuring performance and reliability in cryogenic environments - The latest innovations and industry standards relevant to quantum engineering This course is ideal for electrical and electronic engineers, researchers, and industry professionals in the Middle East seeking to expand their expertise in quantum technology. Whether you are looking to enhance your technical skills, pursue certification, or prepare for career growth in quantum engineering, this program provides the necessary knowledge and practical insights. Choose this online course on our platform for its flexible schedule, expert instruction, and comprehensive curriculum. We are committed to delivering professional training that bridges the gap between theory and real-world applications, empowering you to excel in the field of cryogenic electronics for quantum computing. Upon completing this certified course, you will receive a recognized certificate that validates your specialized skills. This credential can significantly boost your career prospects, open doors to new opportunities in the quantum industry, and position you as a leader in this innovative engineering domain. Enroll today to take your engineering expertise to the next level and become a key contributor in the future of quantum technology. IIT Roorkee July 2018

Engineering Category's Courses

Course Lesson(70)

Lesson 1 : **Cryogenic Electronics for Quantum Computing Promo**

Lesson 2 : **Lec 01 Principles of Quantum Mechanics**

Lesson 3 : **Lec 02 Principles of Quantum Mechanics II**

Lesson 4 : **Lec 03 Schrodinger s Wave Equation**

Lesson 5 : **Lec 04 Schrodinger s Wave Equation II**

Lesson 6 : **Lec 05 Formation of Energy Bands The Kronigâ€“Penney Model K Space Diagram**

Lesson 7 :
Lec 06 Electrical Conduction in Solids The Energy Band and the Bond Model Drift Current

Lesson 8 : **Lec 07 DOS I**

Lesson 9 : **Lec 08 DOS II**

Lesson 10 : **Lec 09 Basic MOSFET Structure symbol and working as a Switch**

Lesson 11 : **Lec 10 MOSFET Operation Depletion Accumulation and Inversion**

Lesson 12 :
Lec 11 MOSFET I V Characteristics Threshold voltage I V Characteristics Transconductance

Lesson 13 : Lec 12 MOSFET I V and Threshold Voltage II

Lesson 14 : Lec 13 Second Order Effects â€“ a Body Effect

Lesson 15 : Lec 14 Second Order Effects b Channel Length Modulation c Subthreshold Conduction

Lesson 16 : Lec 15 Introduction to Cryogenics in Electronics

Lesson 17 : Lec 16 Cryogenic Coolant Fluids used

Lesson 18 : Lec 17 Transition in Properties of materials with variation in Temperature

Lesson 19 : Lec 18 Transition in Properties of materials with variation in Temperature II

Lesson 20 : Lec 19 Semiconductor devices at Room Temperature 300 K

Lesson 21 : Lec 20 Semiconductor devices at Low Temperature below 150 K and 77K

Lesson 22 : Lec 21 Change in Bandgap at Low Temperature I

Lesson 23 : Lec 22 Change in Bandgap at Low Temperature II

Lesson 24 : Lec 23 Change in Intrinsic Carrier concentration

Lesson 25 : Lec 24 Lowering in the level of Fermi Energy

Lesson 26 : Lec 25 Effect of Freeze out on dopant atom concentration

Lesson 27 : Lec 26 Effect of Freeze out on Dopant Atom Concentration II

Lesson 28 : Lec 27 Introduction to Modelling of Cryo MOS Device

Lesson 29 : Lec 28 Device Performance Modelling at Cryogenic Temperatures

Lesson 30 : Lec 29 Semiconductor Device Equations at Low Temperature

Lesson 31 : Lec 30 Incomplete Ionization Models

Lesson 32 : Lec 31 Mobility Models Scattering effect

Lesson 33 : Lec 32 Change in Threshold Voltage

Lesson 34 : Lec 33 Change in Threshold Voltage Trap Based Changes

Lesson 35 : Lec 34 Effect on Mobility

Lesson 36 : Lec 35 Effect on leakage and saturation current

Lesson 37 : Lec 36 Kink observed at higher VDS due to Impact Ionization

Lesson 38 : Lec 37 Subthreshold Swing and Transconductance I

Lesson 39 : Lec 38 Subthreshold Swing and Transconductance II

Lesson 40 : Lec 39 Introduction to MOS Capacitance

Lesson 41 : Lec 40 Traps and Defects at Cryogenic Temperatures

Lesson 42 : Lec 41 C V Characteristics High Frequency and Low Frequency Capacitance

Lesson 43 : Lec 42 Characterization Techniques and Cryogenic MOS Capacitance Modeling

Lesson 44 : Lec 43 Noise Performance and Flicker Noise

Lesson 45 : Live Session for Cryogenic Electronics for Quantum Computing Aug 20 2025

Lesson 46 : Lec 44 Cryo Analog to Digital Converter

Lesson 47 : **Lec 45 Cryo Low Noise Amplifiers**

Lesson 48 : **Lec 46 Multiplexers and Circulators**

Lesson 49 : **Lec 47 Cryo Oscillators**

Lesson 50 : **Lec 48 Cryo Power Management Circuits and Sensors and Sensors Interfaces**

Lesson 51 : **Lec 49 Introduction to Qubits**

Lesson 52 : **Lec 50 Properties of Qubits**

Lesson 53 : **Lec 51 Interfacing Quantum Processor with Classical Controllers**

Lesson 54 : **Lec 52 Quantum Entanglement and Quantum Communication**

Lesson 55 : **Lec 53 Single Qubit System**

Lesson 56 : **Lec 54 Extension to Two Qubit systems and Multiplexing DC and I O signal for 4 qubits**

Lesson 57 : **Lec 55 Multiplexing DC and I O signal for 4 qubits**

Lesson 58 : **Lec 56 Multiplexing techniques based on FDMA TDMA SDMA**

Lesson 59 : **Lec 57 Introduction to Quantum Metrology and Quantum Sensing**

Lesson 60 : **Lec 58 SPADS and Challenges to Quantum Technology**

Lesson 61 : **Lec 59 Qubit readout front end circuits for a Spin qubit b Transmon qubit**

Lesson 62 : **Lec 60 Sensing the Qubits Microwave Technique**

Lesson 63 : **Lec 61 Characterization and Modelling of 22 nm FDSOI Cryogenic RF CMOS**

Lesson 64 : **Lec 62 Modelling of 22 nm FDSOI Cryogenic RF CMOS â€“Part II**

Lesson 65 : **Lec 63 Modelling of 22 nm FDSOI Cryogenic RF CMOS â€“Part III**

Lesson 66 : **Lec 64 Parasitic Capacitance in Nanosheet FETs**

Lesson 67 : **Lec 65 Performance Perspective of Gate All Around Double Nanosheet**

Lesson 68 : **Lec 66 Nanosheet Part I**

Lesson 69 : **Lec 67 Nanosheet Part II**

Lesson 70 : **Lec 68 Nanosheet Part III**

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