Model of standards-based curriculum

For senior division of undergraduate students (years 3 and 4)

Foundations of Quantum Information science	Physics for Quantum Information	Quantum devices	Engineering for Quantum Computation	Quantum Communication Networks

Common subjects

- **Foundations of quantum computation**
- **Foundations of quantum communication**
- **Foundations of quantum cryptography**
- **Technical writing**
- Machine language
- Machine learning
- Category theory
- Probability theory
- Advanced linear algebra
- Advanced differential and integral calculus
- Estimation theory
- Mathematical statics
- Optimization
- Assembly language

Foundations of Quantum Information science

- **Foundations of entanglement theory**
- **Foundations of quantum Shannon theory**
- **Quantum algorithm**
- **Mathematics of quantum cryptography**
- Coding theory
- Geometry
- Advanced algorithm theory
- Computational complexity theory (Turing machine, etc.)

Physics for Quantum Information

- **Group theory in quantum information**
- **Mathematics of information for quantum information**
- **Modeling of quantum computation**
- **Various models for quantum computation**
- **Quantum mechanics of Qudit**
- **Quantum mechanics of CV system**
- Foundations of field theory
- Theory of relativity
- Quantum mechanics
- Statistical physics
- Quantum statistical physics and condensed matter physics

Quantum devices

- **Quantum high-precision measurement and sensor**
- **Introduction to devices for quantum information processing**
- **Foundations of quantum optics and its applications to devices**
- **Superconducting qubit and its microwave control**
- **Cold atom and ion trap**

Engineering for Quantum Computation

- **Quantum automaton and quantum Turing machine**
- **Foundations classical compiler for quantum computation**
- **Foundations of classical architecture for quantum computation**
- **Foundations of classical OS for quantum computation**
- **Foundations for fault tolerant quantum computation**

Quantum Communication Networks

Spiral approach

- **Quantum communication protocol**
- **Quantum communication system**
- **Quantum key distribution system**

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