

# TOP 10 QUESTIONS ABOUT MIT XPRO'S QUANTUM COMPUTING CURRICULUM

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## ONE

**Q : Is the IBM Quantum Experience an actual quantum computer or a software emulation?**

A : The IBM Quantum Experience is a real quantum computer. It is not a simulation of a quantum computer. It is quantum computing hardware. We will write a program that we then send to this cloud quantum computer at IBM and they will implement it there and send the answer back.

## TWO

**Q : Are the course participants going to implement a quantum algorithm on the IBM quantum computer?**

A : That's right. Every learner will have the opportunity to write a quantum computer software code that implements a quantum algorithm. It will be sent to IBM. They run it and send the results back.

## THREE

**Q : What prior physics or mathematical knowledge is required to be successful in the course?**

A : We wanted to develop a course that started from the basics. It is helpful if you've had a course in quantum mechanics and linear algebra at some point. And it's also helpful if you've programmed a computer in some way before.

## FOUR

**Q : Could you please explain near term use of a quantum computer consisting of 100 qubits? What problem that we can solve?**

A : That's an outstanding question. What can we do with quantum computers at a small scale level? I think the first applications are going to be in the domain of quantum simulation where we use a quantum computer to simulate a quantum system.

**FIVE**

**Q : Is it driven to gate model, or will adiabatic quantum computers be covered and how to map problems to this specific hardware?**

A : We will be discussing gate model, adiabatic quantum computing, and quantum annealing. We will touch on how adiabatic quantum computers and quantum annealers work, but the focus of the course is on digital and analog quantum simulation as well as gate model universal quantum computing.

**SIX**

**Q : Will the course touch upon QKD and its implementation with the IBM Quantum platform?**

A : We will touch upon quantum key distribution (QKD). That's a quantum communication protocol. We'll look at a couple different types of QKD as well as random number generation using quantum mechanics. But we won't implement it on the IBM Quantum Experience. The Quantum Experience is solely for quantum computing and not for quantum communication.

**SEVEN**

**Q : Is there any probable applicability of quantum computing in Artificial Intelligence or Machine Learning?**

A : I think so. People are searching for applications in the AI and ML space. There's a lot of excitement and research in these areas. And I can add that there's the concept of using a quantum computer to do AI and ML, but there's also using classical computing and AI to do quantum better. I think it goes in both directions.

**EIGHT**

**Q : What types of job opportunities would be available to those who take this course?**

A : I think understanding the fundamentals and practical realities of quantum information will be very helpful when seeking job opportunities in the quantum space. These courses give you not just a background (that's course 1) but an in-depth look at the issues involved in building a quantum computer or quantum communications system and the current challenges.

**NINE**

**Q : Are these courses helpful to those who do not have programming/tech background and really want to focus on the development of applications of quantum computing in the real world?**

A : Course 1 is at a great level for someone who doesn't necessarily have a programming or tech background, but wants to learn what quantum computing is. Throughout the courses, the topics become more in depth and more technical in nature. In terms of trying to develop real world applications, it takes a village. You're going to have to have people that focus on science and technology, but there's also a very important business aspect to this. And we do try to touch throughout the courses on the business, the engineering, the science, and the technology. We do a 360 degree view of these applications and hopefully you find something useful and interesting to you.

**TEN**

**Q : Are there any estimates as to when quantum computing becomes a major force in the industry? Are we 5, 10, or 15 years away from prevalent use of QC?**

A : I've had numerous people ask me that question, from business, from government, from academia – when are we going to have a quantum computer? There's no clear answer to that. We needed to develop a quantum curriculum like this so people can educate themselves on what are the issues and then make a business decision on when to get in.