



# Quantum engineering

with Professor Sorin Voinigescu

## Talking points

### Knowledge

1. What is a transistor?
2. What is a quantum dot?

### Comprehension

3. Why are qubits a focus of quantum engineering?
4. Why does Sorin's team run computer simulations of transistors?

### Application

5. What challenges do you think the team will face as they integrate their quantum dot arrays with electronic circuits to build a quantum computer?

### Analysis

6. Why is an iterative process essential for developing new technology?
7. Why is quantum engineering an interdisciplinary field?
8. Why do you think that the field of quantum engineering is currently advancing so rapidly?

### Evaluation

9. Average understanding of how computers work is low. To what extent do you agree that computing (including hardware development and software programming) should be taught more widely in schools?
10. Several members of Sorin's team mention the joy of developing real-world applications from theoretical quantum physics. Why do you think this brings such satisfaction? How do you think you would feel if you could use your understanding of abstract concepts to create something practical and useful?

## Activities

### A beginner's guide to quantum dots

Create a 'beginner's guide to quantum dots' that introduces quantum dots to someone with no knowledge of quantum physics. Your guide should explain what quantum dots are and how they can be used for real-world applications.

First, re-read Sorin's article and search for more information online to consolidate your understanding of the different terms and concepts relating to quantum dots, qubits and quantum computing. Then, decide how you will present this information in your guide. For example, you could create a poster, cartoon strip, presentation or leaflet.

How will you use text and images to represent information about quantum dots in an interesting and understandable way? Which concepts are most important, and how can you use simple language, analogies or diagrams to explain them to your audience? How will you ensure your guide is educational, eye-catching and engaging?

Create your beginner's guide to quantum dots and share it with a classmate. After reading/watching it, do they understand what quantum dots are and why this technology is important?

## More resources

- Find out more about Sorin's research: [www.eecg.utoronto.ca/~sorinv](http://www.eecg.utoronto.ca/~sorinv)
- This article presents an accessible and engaging introduction to quantum engineering: [news.mit.edu/2020/explained-quantum-engineering-1210](http://news.mit.edu/2020/explained-quantum-engineering-1210)
- This video provides an overview of qubits and how they drive quantum computing: [www.youtube.com/watch?v=90za6mazNps](https://www.youtube.com/watch?v=90za6mazNps)