**Prepare yourself for exciting possibilities in computer science**

# NCEA Digital Technologies as preparation for studying Computer Science at University

Since 2011, new NCEA Programming and Computer Science Achievement Standards have been phased in to meet the shortage of qualified computer science graduates needed by New Zealand industry. In the first decade of this century the number of computer science students in New Zealand and other western countries plummeted, and yet demand for graduates has risen. The shortage of qualified computer scientists and software engineers has become severe, and the careers available for suitably qualified graduates in these disciplines are exciting.

*"Thanks to my computer science degree, not only do I get to work with some of the biggest and most exciting networks in the world, but also the most talented and friendly people in the world!"*

**William Gittoes**
New Zealand computer science graduate and Google Australia software engineer

The new standards provide opportunities for good preparation for studying computer science and software engineering beyond high school and, more importantly, give you a chance to explore the creative and exciting possibilities that programming and computer science offer.

The programming and computer science standards, which are part of the new Digital Technologies standards, have been designed with input from industry and the computer science departments in New Zealand universities, and we are looking forward to better prepared students taking up the subject after having had some experience of the subject through NCEA.

## What subjects should I take to prepare for a career in CS or SE?

The computer science departments in New Zealand recommend the following preparation for a degree in computer science and/or software engineering:

- A good maths background is important. Statistics, calculus and algebra are all useful, but the main thing is to be comfortable working with mathematical concepts such as formulas and proofs.
- Good communication skills are important. Careers in computing involve working in teams and with clients, where ideas and requirements are exchanged by writing, reading, listening and presenting.
- The new programming and computer science standards provide an excellent foundation for the technical skills required in computer science. Many of the digital technologies standards will be useful, but the following are particularly recommended:

Level 1
- AS91074 Demonstrate understanding of basic concepts from computer science
- AS91075 Construct a plan for a basic computer program for a specified task
- AS91076 Construct a basic computer program for a specified task

Level 2
- AS91371 Demonstrate understanding of advanced concepts from computer science
- AS91372 Construct a plan for an advanced computer program for a specified task
- AS91373 Construct an advanced computer program for a specified task

Level 3
- AS91636 Demonstrate understanding of areas of computer science
- AS91637 Develop a complex computer program for a specified task

The new Programming and Computer Science Achievement Standards are academically challenging, covering a range of topics that are important for producing fast, reliable, secure, large scale and easy-to-use software systems. Topics include algorithms, human-computer interfaces, artificial intelligence, computer graphics, software engineering, and more. They focus on the issues that come up when creating exciting software systems; they aren't about how to *use* existing systems, but how to *invent and build* new ones!

## What advantages will I get by taking these courses in preparation for university?
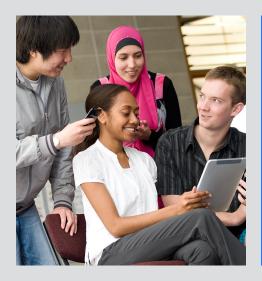
This will vary between different kinds of degrees and different universities, and details will be provided on university websites. One of the main benefits is that you will be better prepared to study computer science, and thus can get higher grades and stand out to employers. However, other benefits that universities are likely to offer include access to accelerated or advanced classes, and scholarships. If you have very good grades in the above standards, as well as maths and other subjects, then direct entry to second year courses may be possible in some universities.

## Can I take computer science at university without doing any at high school?

Yes. At present not all schools offer the new standards and universities will continue to offer pathways for students who haven't taken them. As the standards become more widely available, university courses will be more geared towards students who have completed the above standards at school, but there will still be options for those who haven't done them. There will be advantages, such as accelerated paths, for those who have done them. Eventually we expect this will become the norm and introductory courses will be offered for those who haven't completed the standards at school.

## Which programming language is best to learn in preparation for university?

Computer science graduates typically end up learning several languages, and the most important preparation is having some experience in programming regardless of the language. The most common first-year languages in New Zealand universities are Java, Python and C#, but there's not a lot of benefit trying to learn the particular language that your chosen university uses. In fact, it can be a strength to know a different language so that you have a broader view of programming.

## Isn't computing a lonely and isolated industry?

The image of working in the computing industry portrayed in the media is often quite a different picture to what it is really like. Computer science graduates work on interesting systems that help people in their everyday lives, usually in working conditions that are intended to inspire creativity. To see what the computing careers are like in the 21st century, see www.cs.washington.edu/WhyCSE. Software engineering regularly appears as one of the most desirable jobs to have. Check out careercast.com.

## Are there jobs for computing graduates?

There has never been a higher demand for suitably qualified graduates. A student with good grades typically receives multiple job offers and many have jobs lined up before they complete their degree.

## Why Computer Science and Software Engineering?

Check out:

code.org video

www.cs.washington.edu/WhyCSE

www.cosc.canterbury.ac.nz/csfieldguide/student/Introduction.html

Students who want their pick of jobs (the ratio is roughly 20:1 in favour of computer science vs all other sciences), better pay ($10,000 to $30,000 more than traditional sciences), international travel and the chance to develop products that could be used by millions of people around the world, making a fundamental difference to society... should choose computer science.

**Ian McCrae**
CEO, Orion Health

## Where can I get more information?

Each computer science department has more information here:

www.cs.auckland.ac.nz

www.aut.ac.nz/study-at-aut/study-areas/computing--mathematical-sciences

www.cs.waikato.ac.nz

csit.massey.ac.nz

ecs.victoria.ac.nz

www.cosc.canterbury.ac.nz

www.lincoln.ac.nz

www.cs.otago.ac.nz

This leaflet has been produced by the following computer science departments. It is also available in the form of a web page (for easy access to the links) at: csanz.ac.nz

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
Te Whare Wānanga o Tāmaki Makaurau

MASSEY UNIVERSITY
TE KUNENGA KI PŪREHUROA
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