Bachelor of Science in:
Computer Science, Information Technology
Computer Systems and Networking
Software Engineering (BSc), Software Engineering (BEng)

Double Degrees
Computer Science and Electrical Power, Computer Systems or Electronic and Communication Engineering (BSc/BEng) (BSc/BTech)

scieng.curtin.edu.au
Curtin's computing related courses ensure that students interested in this broad field have many options available for study. Computer Science and IT focus on the technical development of software, Software Engineering specialises in the development of large projects, while Computer Systems and Networking provide graduates with strong industry regarded skills enabling them to design and set up networks. Double degree programs with other courses such as engineering provide students with greater opportunities to combine disciplines that are related, resulting in courses that are challenging interesting and in strong demand by employers.

Unified Technology First Year

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Curtin is recognised locally and internationally for the quality of its graduates in Computer Science, Information Technology, Software Engineering and Computer Systems and Networking.

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Unified Technology First Year

Curtin’s Computer Science, Information Technology and Software Engineering (BSc) degrees all share the same first year program, known as the Unified Technology year. This common first year helps students to make an informed career choice about the specialisation of computing that is most suited to them. Students can choose to change between the courses without increasing the duration of their degree. The Department of Computing provides a high level of support for motivated students. In addition to the assistance provided by lecturers and class tutors, senior tutors are available to assist students outside their class contact time. There is also a mentoring program where successful senior students help new students with a wide range of issues such as time management and how to go about university study.

Careers for Computing Professionals

Computing professionals are employed widely in many different industries and organisations. The dynamic nature of computing technologies also means that jobs available in the future may not yet be apparent today. Some key areas of employment for computing professionals and also emerging areas of employment are listed below.

Bioinformatics

Bioinformatics is the management and analysis of data using advanced computing techniques. Bioinformatics is particularly important in research, where it is necessary to process and analyse large amounts of complex data. This is an emerging technology which is expected to undergo significant growth in the next few years.

Computer Security and Cryptography

Computer Security relates to the protection of electronic data from outside intrusion and tampering. Cryptography is a specialised area of computing security focusing on the encryption of data to make it accessible only to those for whom it is intended.

Database Administration

With the Internet and electronic business creating tremendous volumes of data, there is a growing need to be able to store, manage and extract data effectively. Database administrators work with database management systems software and determine ways to organise and store data. They are often involved in setting up an organisation’s database, determining the specific requirements and then designing and implementing suitable systems. For larger databases they will be part of a team of IT experts who work together to create a database solution.

Networking / Computer Communications

Associated with expanding computer use is the need for different computer systems to communicate with each other. The Internet has changed the way people and organisations communicate. Many computing professionals are involved with “networking”, connecting computers with other offices or departments, IT and computing professionals may be involved in the design of purpose built software or the configuration of standard software to allow free exchange of data. Increased computing demands in businesses translate into a steady increase in the number of

vacancies for IT professionals who are able to configure and maintain networks.

Software Engineering

These professionals manage the interaction between groups or some of the components of software development projects. This includes ensuring that all people involved receive the necessary direction and specified requirements to complete their segments of the system so that each component is ready when needed and does what it needs to do.

Software Maintenance

Software developers update, repair, modify and expand existing programs. Many are also involved in the initial development process and are employed to write software according to the specifications determined primarily by computer software engineers and system analysts. In practice, software developers are often referred to by the language they know, such as Java developers, or the type of function they perform or the environment in which they work, such as database developers/administrators, mainframe software developers, or Internet developers. However, software developers with a good foundation in the fundamentals of programming concepts and an understanding of how all languages are derived can often learn new languages relatively easily.

Systems Analysts

These analysts help organisations to identify ways in which computer technology can be used to improve the way they operate. This process may include planning and developing new computer systems or devising ways to apply existing systems’ resources to additional operations. Systems Analysts may design new systems, including both hardware and software, or add new software application to harness more of a computer’s power.

Software Programming

Systems programmers deal with the design, installation and maintenance of operating systems. Most companies and organisations, both large and small, have an ever-increasing dependence upon computers and therefore there is a high demand for professionals with these skills.

Web Development

Due to the increasing functional requirements and capability of the Internet there are often many specialised roles associated with web development including Graphic Designers, Technical Writers and Information Architects. Specialist roles also exist for professionals with skills in web based programming (e.g. Java, Coldfusion or ASP programming) or maintaining web enabled databases.

Good Reasons to Study Computing

- Creativity and challenge – Solving technical problems or designing products that meet certain criteria often require much more than simply applying rules and following procedures. In addition, the role of the computing professional is to find elegant solutions, write algorithms that work efficiently or to create products that do more than satisfy basic criteria.
- Lots of study options – whether you are interested in developing software, networking computers, designing hardware or developing a gaming algorithm, Curtin offers relevant courses for you.
- Employment – Curtin computing graduates get jobs. In fact, most have job offers even before they complete their studies. Recent graduates now work in exciting positions with well known international companies such as Microsoft, Motorola, Google, IBM, Playoney and local companies such as DTI, Calix and Tomorro.

Graduate profile

Graduate profile

My course covers designing, setting up and maintaining computer networks for various industries. The course material is very comprehensive in its approach and allows me to prepare myself for the workforce. Additional certifications that are part of the course, such as CCNA (Cisco Certified Network Associate), are an added bonus for any fresh graduate joining the networking industry. Curtin arguably invests highly valued in the networking industry, and I’m glad I chose to study here.

Staff profile

Staff profile

Meenakshi Venkatesh is the Director of the Institute of Multi-Sensor Processing and Content Analysis (IMPCA). The Institute develops expertise in the development of tools for large scale pattern recognition and applies it in the area of intelligent living spaces, content creation, surveillance and process control industries. The Institute combines the expertise of computer scientists, engineers, process engineers and health specialists working collaboratively to solve complex technical and social problems. IMPCA has established itself as a world class institute, recognised nationally and internationally as a leader in its field. The institute presents exciting new projects for young computer scientists for basic research and novel technology development.
COURSES:

COMPUTER SCIENCE

Course Structure - Computer Science

YEAR 1
Semester 1
Mathematics 146 or Mathematics 133
Hardware Fundamentals 101
Software Technology 191
Science communications 101
Statistical Data Analysis 101
Semester 2
Introduction to Programming Environments 152
Software Technology 192
Introduction to Operating Systems 101
Elective Unit

YEAR 2
Semester 1
Foundations of Computer Science 152
Artificial and Machine Intelligence 251
Computer Communications 252
Software Engineering 251
Semester 2
Database Systems 252
Computer Graphics 252
Mathematics 104
Software Engineering 252

YEAR 3
Semester 1
Design and Analysis of Algorithms 251
Programming Language Concepts 352
Foundations of Computer Science 351
Project Design and Management 351
Semester 2
Theoretical Foundations of Computer Science 352
3 Option Units

OPTIONAL UNITS AVAILABLE
Software Engineering 351
Software Security 353
Systems Programming and Design 351
Software Engineering Tools and Metrics 352
Network Systems Design 354
Software Engineering for Embedded Systems 352
Computing Project 352
Computer Communications 352
Computing Topics 351
Machine Perception 351
Systems Programming and Design 351
CIRCUIS Course Code 007926B

Computer Science and Information Technology

Curtin offers two programs of study aimed at covering core areas of computing. Graduates are professionally recognised and equipped with the knowledge and foundational understanding that is vital in professions that are characterised by change.


Computer Science

BSc (Computer Science)

Computer Science differs from the Information Technology degree with its stronger emphasis on mathematics. The program is also more focused on the theory underpinning modern computing. The foundation mathematics introduced in this course of study equips students with the necessary skills to extend their knowledge in areas such as engineering and advanced computing.

Information Technology

BSc (Information Technology)

Generally speaking, technology applied to solve problems or increase efficiency associated with storage, manipulation or transfer of data is termed Information Technology. The roles associated with Information Technology are varied according to the nature of the industry (e.g. banking versus research). However, what defines the role of the IT professional is that they use their skills to identify adapt and implement technical solutions to satisfy specific requirements for organisations. For example, an Information Technologist may create a database for monitoring product inventories for a client or they may be involved in the installation and testing of software used for internet purchases.

Information Technology is a three-year program of study offering considerable core material with the Computing Science program. However, the program does not include the same amount of mathematics or subjects related to research. The purpose of the program is for graduates to have essential knowledge of computing fundamentals complemented with practical industry standard skills making graduates immediately useful to employers.

Students studying Information Technology are able to tailor their program to include areas that are of interest or relevant to their career aspirations. Areas include:

• Multimedia and Design
• Health Information Management
• Business Administration
• Engineering
• Science.

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• Multimedia and Design
• Health Information Management
• Business Administration
• Engineering
• Science.

A+B → Double Degree

Double Degree Programs

Computing is such a vital component of today’s technological world that an understanding of computing technology is important in almost every career. Students interested in computing can combine it with other studies. Graduates receive dual qualifications in a period that is available in double degree combinations with Computer Systems, Electrical Power, Electronic and Communication Engineering at five-year programs.

COURSES:

INFORMATION TECHNOLOGY

Course Structure - Information Technology

YEAR 1
Semester 1
Mathematics 103 or Mathematics 136
Hardware Fundamentals 101
Software Technology 151
Science Communications 101
Statistical Data Analysis 101
Semester 2
Introduction to Programming Environments 152
Software Technology 192
Introduction to Operating Systems 101
Elective Unit

YEAR 2
Semester 1
Systems Programming and Design 251
Computer Communications 252
Software Engineering 251
Elective Unit
Semester 2
Database Systems 252
Computer Graphics 252
Software Engineering 252
Elective Unit

YEAR 3
Semester 1
Foundations of Computer Science 351
Programming and Design 361
Project Design and Management 351
Optional Units
Semester 2
Select 4 Options

OPTIONAL UNITS AVAILABLE
Foundations of Computer Science 152
Design and Analysis of Algorithms 251
Theoretical Foundations of Computer Science 352
Software Engineering 351
Software Security 353
Software Engineering Tools and Metrics 352
Network Systems Design 354
Programming Language Design Concepts 351
Artificial and Machine Intelligence 251
Computer Communications 352
Computer Graphics 352
Machine Perception 352
CIRCUIS Course Code 007926D
Software Engineering

Development of large-scale software for commercial purposes is beyond the ability of the individual and often requires many people. Because of the sheer size and complexity of most software requirements today, the development process involves teams of professionals with specialist skills working together. As with any large engineering project involving multiple staff, many factors must be managed aside from those that are purely technical. These include having a finite financial and time budget and needing to satisfy the requirements of the client.

Software engineers are involved in ensuring that a software project is properly managed, is within budget and does what it is supposed to do. In doing so, the software engineers must undertake many engineering and management related tasks. Software engineers must meet clients to determine their requirements and develop specifications that clearly define the requirements of the proposed system. They must use their communication skills to understand the client's priorities and the problems they are trying to solve. The software design and implementation phases involve several teams of software engineers working in tandem to produce different components of the required system. Today's world of rapidly changing technology means that software engineers will be incorporating the latest technology in their software implementation. Quality control is also a critical part of this process as each software component must be thoroughly tested before being incorporated into the complete system.

Curtin's Software Engineering Courses

The aim of software engineering courses at Curtin is to produce graduates who will be well-equipped to work in the software industry in the production of large-scale software. Two options of study are available to students wishing to become Software Engineers. Students can choose to undertake either a four year Bachelor of Engineering (Software Engineering) or a three year Bachelor of Science (Software Engineering) program. Both courses provide graduates with strong theoretical foundations as well as practical skills in areas of technical expertise that continues to be in great demand throughout Australia such as Java, Unix, Project Management, and Security skills.

Bachelor of Engineering (Software Engineering)

The Bachelor of Engineering (Software Engineering) (four years) incorporates a first year of study common with other engineering disciplines offered at Curtin. The advantages of commencing engineering studies via a common first year are that students are able to make an informed career choice about the specialisation of engineering that is most suited to them. The program produces graduates with a broad knowledge and appreciation of the various engineering roles in industry. In engineering companies with diverse capabilities and projects, such integrated skills are often useful.

Bachelor of Science (Software Engineering)

The Bachelor of Science (Software Engineering) (three years) degree prepares graduates to work as practicing software engineers in a commercial software development environment. The Bachelor of Science (BSc) is attractive to prospective students who wish to undertake a shorter program of study with less breadth than the Bachelor of Engineering (BEng). Students immediately commence studies in the area of their chosen specialisation of software engineering, which may be attractive to those who are confident of the career they wish to pursue. BSc students are able to graduate after three years of study allowing them to embark on a career in a shorter period of time than the BEng graduates.

An additional honours year is available to qualified candidates who wish to pursue a research career path or simply gain a more in-depth knowledge in a specialist area through research or to make them more competitive in the IT job market.

Course Structure - BEng Software Engineering

YEAR 1
Bachelor of Engineering Pre-Major

YEAR 2
Semester 1
- Mathematics 103
- Software Technology 151
- Software Engineering 251

Semester 2
- Introduction to Programming Environments 152
- Software Technology 152
- Programming Management 202
- Software Engineering 251

YEAR 3
Semester 1
- Design and Analysis of Algorithms 251
- Software Engineering Tools and Metrics 352
- Software Engineering Project 451

Semester 2
- Requirements Engineering 252
- Computer Graphics 252
- Database Systems 252
- Elective Unit

YEAR 4
Semester 1
- Software Engineering 351
- Software Engineering Tools and Metrics 352
- Software Engineering Project 451

Semester 2
- Software Engineering for Embedded Systems 352
- Software Engineering Project 452
- Software Engineering Testing 353

OPTION UNITS AVAILABLE
- Management 100
- Psychology 123
- Artificial and Machine Intelligence 251
- Software Security 361
- Programming Language Design Concepts 162
- Foundations of Computer Science 351
- Systems Programming and Design 361
- Theoretical Foundations of Computer Science 352
- Network Systems Design 304
- Computer Communications 392
- Machine Perception 362

YEAR 1
Semester 1
- Mathematics 103
- Software Technology 151
- Science Communications 101
- Statistical Data Analysis 101

Semester 2
- Introduction to Programming Environments 152
- Software Technology 152
- Introduction to Operating Systems 151
- Option Unit

YEAR 3
Semester 1
- Design and Analysis of Algorithms 251
- Software Engineering 251
- Computer Communications 252
- Project Design and Management 351

Semester 2
- Requirements Engineering 252
- Computer Graphics 252
- Database Systems 252
- Software Engineering 252

YEAR 4
Semester 1
- Software Engineering 351
- Software Engineering Tools and Metrics 352
- Software Engineering Project 351
- Option Unit

Semester 2
- Software Engineering for Embedded Systems 352
- Software Engineering Project 452
- Software Engineering Testing 353
- Option Unit

Computer Systems & Networking

BTech Computer Systems and Networking

For students wishing to specialise in computer networking, this three year Bachelor of Technology degree addresses a significant market demand for skills associated with the design of distributed computing environments and the networks that underpin them. It encompasses computer technology, in both hardware and software, as well as computer communications and networking incorporating Local Area Networks (LANs), Metropolitan Area Networks (MANs), and Wide Area Networks (WANs) together with network management. The course covers the design and support of modern distributed computer and telecommunication networks.

A feature of the degree is the integrated certification based training with network technology leader, Cisco. The teaching department is also an authorised Cisco Networking Academy and has a professional technical team, who are able to support students. Facilities include a PC production facility, a central workshop, IT support and electrical workshop.

The program is structured around the following key areas:
- Network Design and Administration / Management
- Convergence of Information Technology & Telecommunications
- Embedded Web System Design
- Computer Hardware and Software co-design
- Real-time Systems
- Information Technology Technical support

To ensure the course offers up-to-date and relevant information to tomorrow’s technologies, the academic staff is comprised of both PhD qualified academics and qualified information technology professionals working in the industry.

Course Structure - Computer Systems and Networking

YEAR 1
Semester 1
- Mathematics 103
- Computer Communications 101
- Network Systems Design 101
- Statistical Data Analysis 101

Semester 2
- Engineering Programming 104
- Computer Communications 152
- Computer Systems 201

Semester 2
- Embedded Software Engineering 204
- Embedded Software Testing 152
- Embedded Systems 302
- Database Systems 252

YEAR 3
Semester 1
- Embedded Systems Engineering 351
- Distributed Networks 301
- Wireless Data Networks 303
- Elective Unit

Semester 2
- Computer Technology Project 392
- Network Engineering 304
- Network Systems Design 304
- Computer Communications 352
- Off

Instrumentation and Control 402

Industries Where Computing Graduates Work

- Banking and Finance
- Dairy Industry
- InsurTech
- Transportation
- Cytometry
- Energy
- Manufacturing
- Medical Devices
- Aluminium Industry
- Market Research
- Telecommunications
- Forestry
Entry Requirements

**Local Students**

Standard University entry requirements plus suitable TER (ATAR) and specific TEE prerequisites:

- Computer Science, IT, Computer Systems and Networking - Discrete or Applicable Mathematics
- Software Engineering or double degrees with engineering - Applicable Mathematics plus at least two of Physics, Calculus, Chemistry

**International Students**

Standard University entry requirements, as well as specific prerequisites:

- Computer Science, IT, Computer Systems and Networking - Advanced or Standard Mathematics
- Software Engineering or double degrees with engineering – Advanced Mathematics plus at least two of Physics, Calculus, Chemistry

More Information

scieng.curtin.edu.au

International Students

International students studying in Australia on a student visa can only study full-time and there are also specific entry requirements that must be met.

Please refer to international.curtin.edu.au or phone +61 8 9266 7331 for further information, as some information contained in this booklet may not be applicable to international students. Australian citizens and permanent residents, and international students studying outside Australia, may have the choice of full-time, part-time and external study. Information about TISC only applies to Australian residents.

Further Study Options

- Postgraduate Diploma in Computing
- Master of Science (Computer Science) by Coursework
- Masters and PhD programs by Research

Current Computing Research at Curtin

There are currently many computing related research projects being undertaken at Curtin. Some of the major projects attracting attention include:

- Large-Scale Surveillance - Developing large-scale surveillance systems and efficient integration of multiple distributed sensors for monitoring human activities using computing methods.
- Smart Homes - Smart Homes allow senior citizens to maintain their dignity without compromising their daily lives and help them to preserve an independent lifestyle.

This involves using computing technologies to play a constructive and supportive role by monitoring a person's movements in a non-invasive manner, and determining when assistance is required.

**GEODE** - is a new social browser that harvests readily available context information (GPS, Bluetooth, user) when multiple media such as photos, video, audio, or activity streams (eg. from Twitter, Facebook, etc.) are acquired through cell phones and uses it for multimedia navigation, search and sharing. Separate context streams are recorded on the phone, and related to media captured (on the phone or other devices) based on recorded time. Our framework integrates and unifies all time-based media and uses contextual meta-data to construct novel, rich browsers, facilitating the sharing of both data and meta-data across users.

Brad Williamson was always fascinated with computers and all things related. He felt that the IT industry offered diverse careers and that there would continue to be plenty of opportunities worldwide for many more years. Brad chose to study a BSc in Computer Science because he thought it would give him fundamental skills which he could apply to a wide range of areas, whether it be networking, graphics or research.

During his studies Brad was involved in some interesting projects. One of these was working on the development of the Network Management (Netman) suite of products, designed to allow network managers to passively monitor a network and diagnose common network problems quickly and efficiently.

After he graduated Brad was offered a position with Microsoft in Seattle. He is now a software design engineer with the Windows Network Developer Platform (WNDP) group, responsible for providing Windows developers with the set of APIs that help write applications to communicate across the network. Brad's role with Microsoft is diverse,

“**My job involves designing, coding and testing software, writing technical documentation and working with program management to define and prioritise software features.**”

It even involves talking to, and supporting, customers! So far, the industry and the opportunities available have lived up to Brad's expectations.

For more, contact:

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Part time and external study is only available to Australian resident students and International students studying outside Australia. Full details of units and course structure can be obtained by contacting the above or electronically from http://handbook.curtin.edu.au

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