Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

School of Computer Science & Statistics (SCSS)
Faculty of Science, Technology, Engineering and Mathematics (STEM)

Bachelor or Master's in Computer Engineering or Electronic and Computer Engineering

COURSE CODE TR032
Engineering Common Entry Programme

Special Entry Requirements:
Leaving Certificate: H4 Mathematics

Other Examination Systems:
www.tcd.ie/Admissions/undergraduate

All jobs in engineering require interaction with people. Whether they are working in a team situation, or just asking for advice, engineers need to have to a high level of both oral and written communication skills. Computer Engineering in Trinity will give you the opportunity to work closely with the academic staff, postgraduate researchers and industry to help develop these skills.

About the Programme

This programme offers you the option to study for a Bachelor's degree over four years or a Master's degree over five years. The degree (with specialisation in either of two streams – *Computer Engineering or Electronic and Computer Engineering)*, is based on two years of general engineering at Trinity. The degree provides students with a firm grounding in the principles common to all engineering disciplines followed by two years of specialisation in either stream. The choice to study for the Master's degree is made at the end of the third year of the programme. Students can specialise in a wide range of topics and follow their own lines of research.

Computer Engineering or Electronic and Computer Engineering at Trinity

These two streams explore how computer systems are designed and built and how they can be applied in a variety of settings.

Computer Engineers generally focus more on software whereas Electronic and Computer Engineers organise both hardware and software components into useful and productive systems. Computer Engineers are also involved in activities that include writing software and firmware for embedded microcontrollers, designing VLSI chips, designing operating systems, building next-generation high-speed communications networks, and developing secure and pervasive wireless networks. Computer engineers are also suited to robotics research which relies heavily on using digital systems to control and monitor electrical systems like motors, communications, and sensors.

What do the graduates say?

"I chose to study Engineering at TCD because I liked that the first two years were general and covered a wide range of topics. I really enjoyed programming and problem solving and was immediately drawn to the logical side of computers and specialised in Computer Engineering in my final years."

After finishing my PhD I became a research scientist at IBM Research Ireland where we study smarter cities and take inspiration from many disciplines including Social Science and Urban Planning trying to figure out solutions that will make the city a better place. You can be very creative in computer science. Thinking differently about problems tends to lead to the most interesting solutions. At Trinity I met great people, many of them still my best friends. Most of all during my time there I learned 'how to learn' and once you master that, anything is possible.

It is a great time to be in the IT industry with so many innovative companies establishing themselves in Ireland. It is also a particularly great time to be a woman in IT with emerging role models such as Sheryl Sandberg and Marissa Mayer. I have worked in two research labs in IBM, Cambridge MA and Dublin, and both research directors were women so there really are excellent opportunities for women to take leadership roles in IT."

Elizabeth Daly, Computer Engineering Graduate

"I originally intended to focus on Mechanical engineering but quickly rediscovered an aptitude for computers, and decided to specialise in Computer Engineering instead. Since the course is divided into two broad engineering years and the later specialised sophister years, it gives you an opportunity to make sure you enjoy your specialisation before you commit to it. The broad grounding of the first two years also turned out to be useful in many surprising ways in my career as an entrepreneur.

In 4th year I decided to start an SMS messaging company with some Trinity friends. This company now employs 60 people between Ireland and the UK. A few years later we were inspired by Havok, another Trinity company, to start DemonWare, to help games studios put their games online. Within 4 years we had worked on 50 Xbox and Playstation games, and were soon bought out by Activision (one of our biggest customers). Since DemonWare I've been involved in about ten other startups in diverse industries, and have found myself at the centre of Dublin's burgeoning technology startup scene.

I started these companies with people I met in Trinity, using skills that I learned in Trinity. Just a few years in Trinity left me inspired by some of the smartest people in my generation, equipped with problem solving and organisational skills that would haven taken a decade to pick up in a normal career. I'm privileged to say that engineering in Trinity put me on a path that continues to reward me to this day.

Sean Blanchfield, Computer Engineering Graduate, Chief Technology Officer and co-founder, DemonWare

"I found that computer engineering ticked all the boxes for me with its combination of theoretical and practical elements. College is more than about lectures and labs. I found that the lecturers were fully supportive of my participation in competitions, internships and related research outside the scope of the course. I found that they were interested not only in how well I was doing in class but urged me on to fulfil my potential more broadly."

The course has relevance across a broad range of sectors and in my summers I got very interesting work experience in investment banks in London and with JPL NASA in California.

Towards the end of my course, I applied for PhD positions at some of the top universities and institutes around the world. It was great to discover that not only is Trinity well known but is highly regarded among those I spoke to. I am delighted to have been awarded the Donal Morphy Scholarship, by The Queen's College, University of Oxford, for my DPhil in Machine Learning.

Having spent four years in Engineering, I now have friends across a wide range of fields from software and games development, to telecommunications, from consultants to investment bankers among others. I have no doubt that this will prove a powerful network in the years ahead.

Computer Engineering gives you the tools to open the door into a range of careers – the rest is up to you!"

Jack Fitzsimons, Computer Engineering Graduate

"I always enjoyed studying maths and physics in school. I chose to study general engineering because it offered a course where I could further study the theory and application of the subjects I enjoyed at school. General engineering offers a wide range of subjects that centre around problem solving. I also chose Trinity College because it has an excellent worldwide reputation and is in a great location in the centre of town."

After 2 years, I found myself really enjoying programming, something I had never considered before college. The flexibility of the Computer and Electronic stream allows a greater choice in subjects which really appealed to me. It's a tough but rewarding course. I found the lecturers really helpful throughout the 5 years and always willing to help if you were having any problems. In my 4th year, I had the opportunity to complete an internship in Analog Devices, an electronic engineering company. This allowed me to gain invaluable industry experience that really appeals to employers.

Graduating from Computer and Electronic engineering, the career prospects are diverse and plentiful. Myself and my classmates have secured jobs in a wide range of industries such as telecommunications, automotive and finance.

I really enjoyed the Computer and Electronic engineering course and I leave with great friends and a wide range of transferable skills."

Maria Murphy, Computer Engineering Graduate

Frequently Asked Questions

What programming languages do you teach?

We are continuously reviewing the programming languages used because we believe that, rather than teaching you to programme using one or two languages, you should be able to learn how to use the programming language best suited to solving a specific problem. We currently use Java and C/C++, among others. We also use ARM assembly language and VHDL for courses in computer architecture and hardware design.

What are the entry requirements for Engineering at Trinity?

Apart from the general TCD matriculation requirements, which are set out in the undergraduate prospectus and on the TCD web site (www.tcd.ie/Admissions) a C3 in Higher Level Leaving Certificate Mathematics (or equivalent) is required.

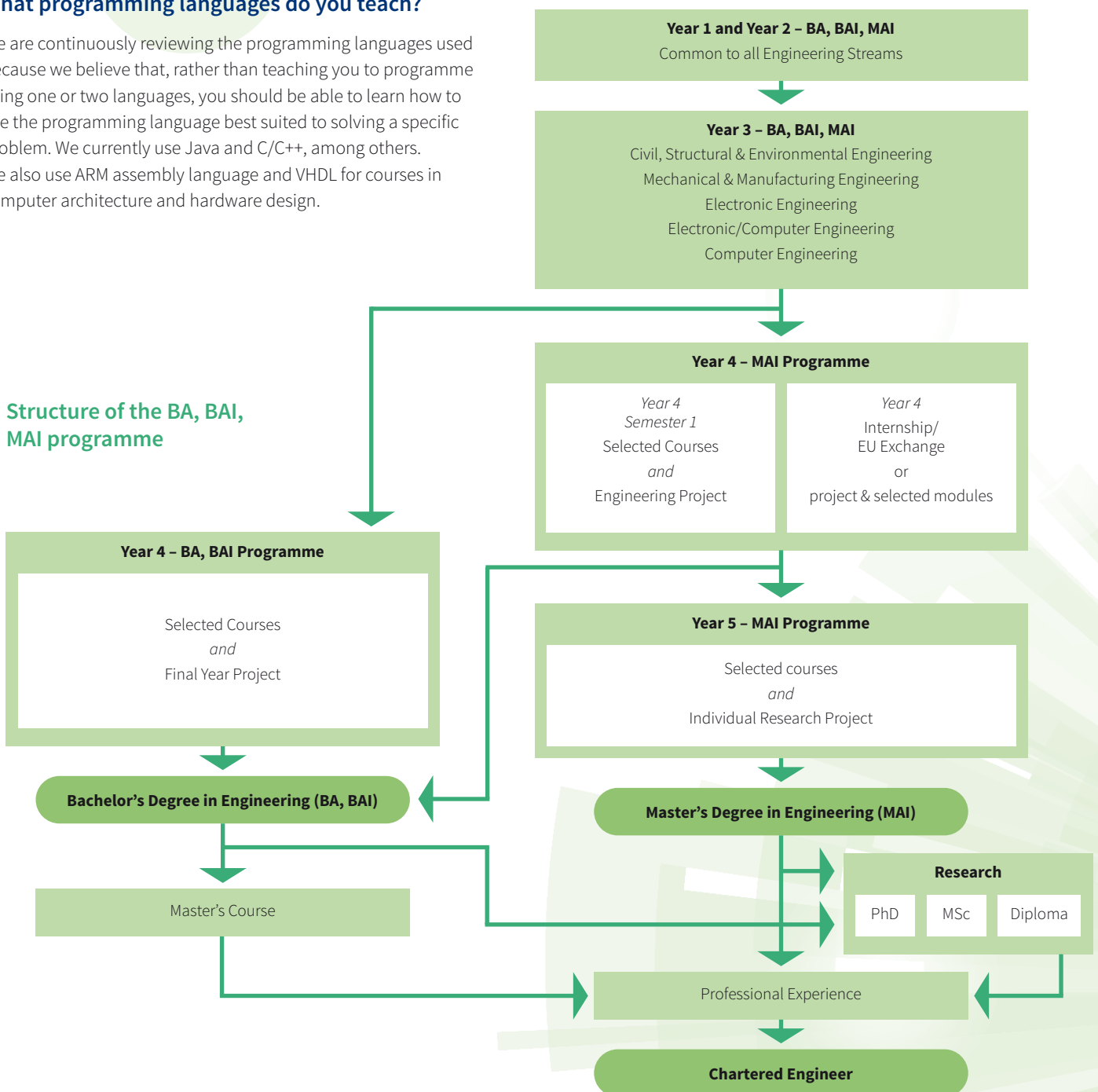## How many hours of lectures, labs and tutorials will I have each week?

The number of hours spent in lectures, labs and tutorials each week varies, but you could expect to have approximately 27 contact hours per week in first year and 25 contact hours per week in second year. In first year you will have approximately 16 hours of lectures, five hours of labs and six hours of tutorials each week. You will also need to spend additional time working on coursework projects and assignments, both in teams and on your own.

Structure of the BA, BAI, MAI programme

Year 1 and Year 2 – BA, BAI, MAI
Common to all Engineering Streams

Year 3 – BA, BAI, MAI
Civil, Structural & Environmental Engineering
Mechanical & Manufacturing Engineering
Electronic Engineering
Electronic/Computer Engineering
Computer Engineering

Year 4 – MAI Programme

| *Year 4 Semester 1* Selected Courses *and* Engineering Project | *Year 4* Internship/ EU Exchange *or* project & selected modules |

Year 4 – BA, BAI Programme

Selected Courses
and
Final Year Project

Year 5 – MAI Programme

Selected courses
and
Individual Research Project

Bachelor's Degree in Engineering (BA, BAI)

Master's Degree in Engineering (MAI)

Master's Course

Research

| PhD | MSc | Diploma |

Professional Experience

Chartered Engineer

Bachelor or Master's in Computer Engineering

First Year – Junior Fresh	Second Year – Senior Fresh
(Common Engineering Programme)	(Common Engineering Programme)
Mathematics	Mathematics and Applied Probability
Programming & Algorithm Design in C	Object Oriented Programming & Data Structures in C++
Physical Science	Solids and Structures
Mechanics	Thermo Fluids
Electricity and Magnetism	Electronics
Engineering Graphics and Computer Aided Engineering	Engineering Science and Engineering Design
Laboratories, Design and Project Work	Materials
Engineering and society	Laboratories, Design and Project Work

Stream 1: Specialisation in Computer Engineering (Range of Options subject to change)

Third Year – Junior Sophister	Fourth Year – Senior Sophister	Fifth Year – MAI
Engineering Mathematics Probability and Statistics Signals and Systems Digitals Circuits Microprocessors I & II Data Structures and Algorithms Digital System Design Telecommunications Computer Networks Operating Systems	CEU44E01 Management for Engineers EEU44E03 Research Methods CSU44D01 Information Management for Engineering CS7NS5 Security and Privacy – second semester	Either EE5C16/EE4C16 Deep Learning or CS7CS4 Machine Learning is compulsory
	Options 1st semester EEU44C04/CSU44031 Next Generation Networks EEU44C05 Digital Signal Processing EEU44C16 Deep Learning and its Applications CSU34021 Computer Architecture II CSU44052 Computer Graphics CSU44053 Computer Vision CSU44056 Data Visualisation CSU44000 Internet Applications EEU44C01 Integrated Systems Design	**Options 1st semester** EE5C16 Deep Learning EE5M01 Integrated Systems Design CSU55001 Fuzzy Logic and Control CSU55004 Formal Verification CS7CS4 Machine Learning CS7NS1 Scalable Computing CS7NS4 Urban Computing CS7IS1 Knowledge And Data Engineering CS7IS3 Information Retrieval and Web Search CS7CS3 Advanced Software Engineering – **across first and second semester**
	Options 2nd semester EEU44C08 Digital Image and Video Processing EEU44C21 Reconfigurable Networks CSU44D02 Knowledge Engineering CS7NS5 Security and Privacy CSU44054 Augmented Reality (CSU44052/CSU44053 suggested)	**Options 2nd semester** EE5C01 Motion Picture Engineering [10 credits] EEP55C25 Algorithms for Quantum Computing EEU44C08 Digital Image and Video Processing CS7DS2 Optimisation Algorithms for Data Analysis CS7IS2 Artificial Intelligence CS7GV3 Real Time Rendering Prerequisite: CSU44052 Computer Graphics CS7GV5 Real Time Animation Prerequisite: CSU44052 Computer Graphics CS7NS6 Distributed Systems CS7NS2 Internet of Things CS7NS5 Security and Privacy CS7IS5 Adaptive Applications CSP55031 Reconfigurable Networks

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

CC 06508 10/22

The College reserves the right to update aspects of the course at any time.