Bachelor and Master’s in Engineering/Electronic and Computer Engineering/Computer Engineering (BA, BAI, MAI)

COURSE CODE TR032
Engineering Common Entry Programme

Special Entry Requirements:
Leaving Certificate: HC 3 Mathematics

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

About the Programme
This programme offers you the option to study for a Bachelor’s degree (BA, BAI) over four years and a Master’s degree (MAI) over five years. The BAI (with specialisation in either of two streams: Electronic and Computer Engineering or Computer Engineering) degree is based on two years of general engineering, providing 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 (MAI) 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.

Electronic & Computer Engineering and Computer Engineering
These two streams explore how computer systems work and how they integrate with other systems that surround us. Computer Engineers can be involved in many hardware and software aspects of computing, from circuit design to software engineering, from microprocessor design to supercomputer algorithm development. 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. 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.
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 have 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**

“The diversity of Engineering at TCD and the options which it provided were my main reasons for choosing the course. Being still undecided about what direction I wanted to take, the first two years of the course gave me experience in the various engineering disciplines allowing me to make an informed choice about which stream of engineering to follow.

Electronic and Computer Engineering was a very interesting and varied course taught by lecturers who were approachable and whose enthusiasm for the subject provided an excellent environment in which to learn.

The respect which the TCD engineering course enjoys with employers allowed me to find employment immediately after I completed my degree. Since starting with New York Stock Exchange Technologies I appreciate the skills that I gained over the course of my studies and project work – in particular the problem solving skills, the ability to see the bigger picture and the exposure to C++.

Electronic and Computer Engineering has been a great choice for me as it has equipped me with a bank of transferable skills leaving me with a wealth of options for the future.”

**Mark O’Callaghan, Computer Engineering Graduate and Trinity Scholar**

“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**
Frequently Asked Questions

How much do I need to know about computers to do Computer Engineering?

No prior knowledge of computers is required, although any experience that you have may be helpful.

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 Computer Engineering?

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.
### Bachelor and Master’s in Engineering/Electronic and Computer Engineering/Computer Engineering (BA, BAI, MAI)

#### First Year – Junior Freshman

- (Common Engineering Programme)
  - Mathematics
  - Computer Science
  - Physical Science
  - Mechanics
  - Electricity and Magnetism
  - Graphics and Computer Aided Engineering
  - Laboratories, Design and Project Work

#### Second Year – Senior Freshman

- (Common Engineering Programme)
  - Mathematics and Applied Probability
  - Computer Science
  - Solids and Structures
  - Thermo Fluids
  - Electronics
  - Engineering Science and Engineering Design
  - Materials
  - Laboratories, Design and Project Work

### Stream 1: Specialisation in Electronic and Computer Engineering

#### Third Year – Junior Sophister

- Engineering Mathematics/Engineering Analysis
- Applied Probability/Probability Modelling
- Signals and Systems
- Digital Signals
- Microprocessor Systems I & II
- Software Design and Implementation
- Management for Engineers
- Computer Networks
- Computer Architecture II
- Digital Systems Design
- Electronic Design and Implementation

#### Fourth Year – Senior Sophister

- Management for Engineers
- Data Engineering
- Computer Architecture III
- Computer Graphics
- Computer Vision
- Knowledge Engineering
- Sustainable Computing
- Augmented Reality
- Security of Networks and Distributed Systems
- Integrated Systems Design
- Wireless Communications
- Digital Signal Processing
- Introduction to Bioengineering
- Digital Control Systems
- Digital Communications
- Digital Media Processing
- Microelectronic Circuits
- and Engineering Project or Internship/EU Exchange

#### Fifth Year

- Distributed Systems
- Fuzzy Logic
- Formal Methods
- Advanced Computer Architecture
- Networked Applications
- Artificial Intelligence for IET
- Real Time Animation
- Wireless Networks & Communications
- Statistical Signal Processing
- Speech and Audio Engineering
- Physiological Measurement and Data Analysis
- and Individual Research Project

### Stream 2: Specialisation in Computer Engineering

#### Third Year – Junior Sophister

- Engineering Mathematics/Engineering Analysis
- Applied Probability
- Signals and Systems
- Digital Signals
- Microprocessor Systems I & II
- Software Design and Implementation
- Management for Engineers
- Computer Networks
- Operating Systems and Concurrent Systems
- Computer Architecture II

#### Fourth Year – Senior Sophister

- Management for Engineers
- Data Engineering
- Computer Architecture III
- Computer Graphics
- Computer Vision
- Knowledge Engineering
- Sustainable Computing
- Augmented Reality
- Security of Networks and Distributed Systems
- and Engineering Project or Internship/EU Exchange

#### Fifth Year

- Distributed System
- Fuzzy Logic
- Formal Methods
- Advanced Computer Architecture
- Networked Applications
- Artificial Intelligence for IET
- Real Time Animation
- and Individual Research Project

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