

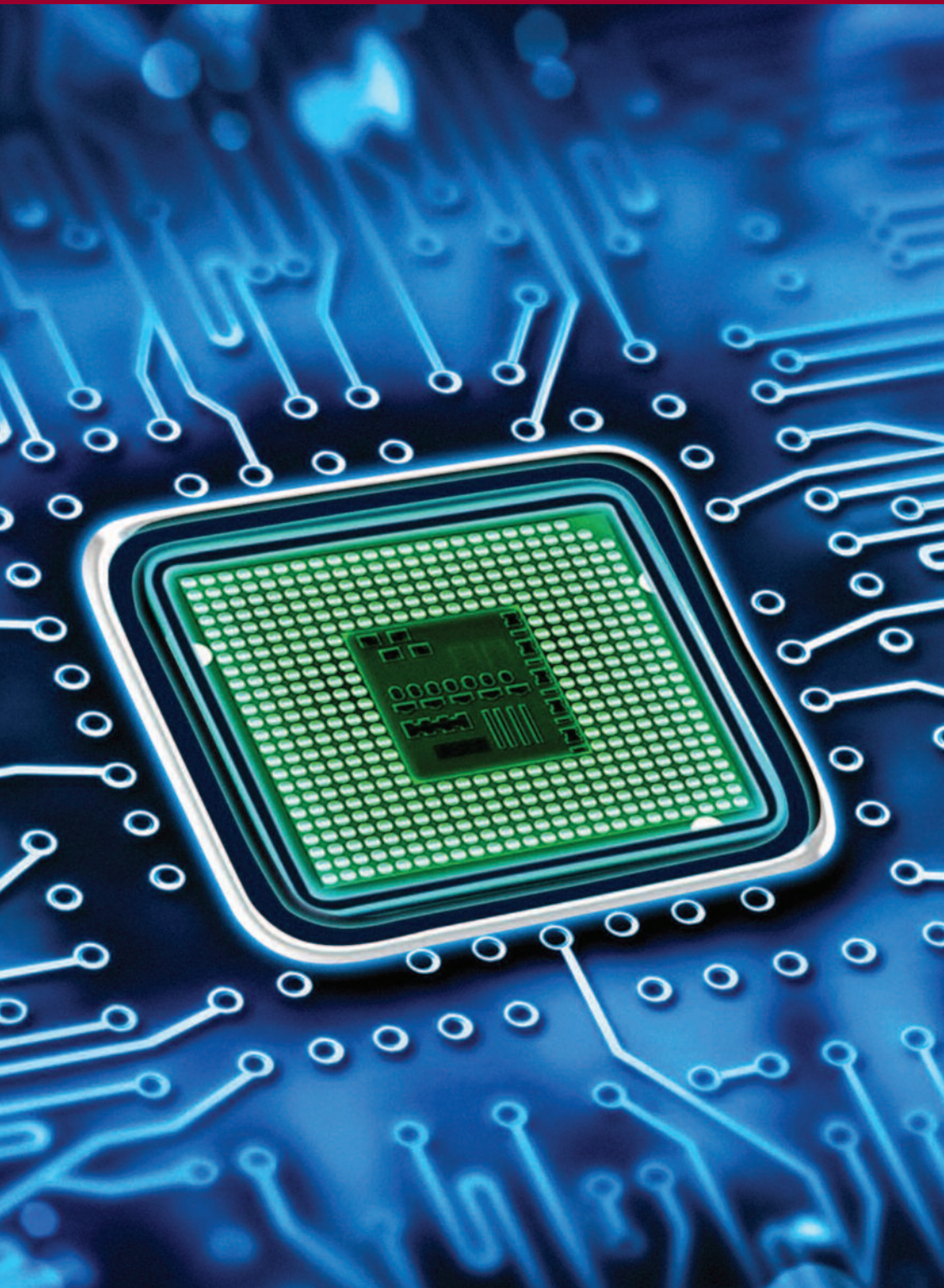
The UK's European university

University of  
**Kent**



# SCHOOL OF COMPUTING

/ Graduate  
study



# WHY CHOOSE POSTGRADUATE STUDY?



**Postgraduate study provides many benefits and can open up new opportunities. At Kent, we offer an academically stimulating environment and the support you need to progress to a satisfying career or further study.**

Postgraduate study enables you to:

- gain an edge when applying for jobs – lots of people have BSc degrees, so an MSc helps you to stand out from the crowd
- prepare for jobs that involve technical leadership, whether in business or industry
- change career, for example if it's difficult to find work in your original field or you no longer find it interesting
- apply for jobs that require a postgraduate qualification (eg teaching, cutting-edge research and development posts)
- update, deepen or broaden your knowledge of key technologies
- develop advanced intellectual and other transferable skills
- learn more about a subject you enjoy, perhaps with a view to working in that area or doing a PhD.

*"I applied for a Master's because I wanted to challenge myself, to see what I was capable of and open up career opportunities. I chose Kent because of the high quality of teaching that the School of Computing is known for."*

**Don Shaw-Case**  
MSc Advanced Computer Science



# INTRODUCTION



## Study for a postgraduate qualification and open up a wealth of career opportunities and routes to further study.

The School of Computing is home to world-leading researchers in key areas such as programming languages, computer security, computational intelligence, data science, computer education and interdisciplinary work with biosciences and psychology. Whether you are interested in a taught programme or in research, we provide a stimulating and supportive academic environment.

Our taught programmes are designed to offer you flexibility in terms of entry route, content and format. You can study full-time or part-time, take up an industrial placement in the UK or overseas, and gain work experience with the Kent IT Consultancy.

## World-leading research

Based on our results in the most recent Research Excellence Framework (REF), 'computer science and informatics' at Kent was ranked 12th in the UK for research intensity in the *Times Higher Education*. The *THE* also ranked the School 22 out of 89

for research power, with 100% of the School's research impact rated world leading or internationally excellent. In the Computer Science Rankings, programming languages research at Kent is ranked 18th in the world in 2018.

To find out more about the research interests of our academic staff, read their profiles at [www.cs.kent.ac.uk/people](http://www.cs.kent.ac.uk/people)

## Teaching excellence

The University of Kent was awarded gold, the highest rating, in the UK government's Teaching Excellence Framework. In the School of Computing, students benefit from excellent teaching and enjoy a high level of access to academic staff. The School counts among its staff a National Teaching Fellow (an award made for outstanding contribution to teaching in higher education), authors of widely used textbooks, a recipient of the Association for Computing Machinery (ACM) SIGCSE award for 'outstanding contribution to computer science education' and an ACM Distinguished Scientist. Two award-winning teaching systems, Greenfoot and BlueJ, used in over 1,000 institutions worldwide, were developed here at Kent.

## Superb facilities

The School's makerspace, The Shed, provides exciting teaching and collaboration opportunities. Among other equipment it contains a milling machine, 3D printers, laser cutter and extensive space for building and making digital artefacts (see p20 for more details). The School also has high-performance computing equipment with state-of-the-art graphics cards and a virtual machine server that supports computer security experiments. We provide dedicated space for use by Master's students.

In addition to the provision within the School of Computing, you have access to the University's central facilities. Woolf College provides accommodation and academic and social space specifically for postgraduates. The Templeman Library, located at the heart of the Canterbury campus, has recently been redeveloped to provide a bright, modern research and study centre that meets the needs of today's students.

## Enhanced career prospects

During your studies, you acquire a high level of academic knowledge and specialist practical skills. We also help you to develop key transferable skills that are essential within the competitive world of work. These include the ability to adapt to challenges, analyse complex real-world problems and develop original ideas that can be applied to all aspects of future work.

Our award-winning Careers and Employability Service can help you to plan for your future by offering one-to-one advice at any stage in your postgraduate studies. It also provides online advice on employability skills, career choices, applications and interview skills.

For more information on the careers help we provide at Kent, visit our Employability web page at [www.kent.ac.uk/employability](http://www.kent.ac.uk/employability)

## Links with industry

An industrial placement is a great way to enhance your career prospects and all full-time taught Master's students have the opportunity to spend time on placement. Having developed relationships with companies over many years, our placement advisers have an excellent understanding of the skills and experience that our industrial partners are looking for. They help you to tailor your application to meet the business's requirements and provide ongoing support while you are on placement. See p16 for more information.

## Graduate School

As a postgraduate student, you also have the support of the Graduate School, which promotes your academic interests, co-ordinates the Researcher Development Programme and the Global Skills Award, and facilitates cross-disciplinary interaction and social networking. To find out more, see [www.kent.ac.uk/graduateschool](http://www.kent.ac.uk/graduateschool)

## Funding

The financial support Kent offers for postgraduate students ranges from research studentships to location-specific funding, sport and music scholarships, and funding specifically for overseas fee-paying students. For further information, visit [www.kent.ac.uk/pgfunding](http://www.kent.ac.uk/pgfunding) or see p22.

# MASTER'S CONVERSION DEGREE

**The MSc in Computer Science is a conversion degree programme. You do not need any prior knowledge or experience of computer science to take this course.**

The course is designed to prepare graduates from any discipline for a career in computing, or a career involving the application of computing within their original professional field. Our students come from a wide variety of backgrounds, including natural sciences, engineering, arts, humanities and social sciences.

All taught Master's programmes in the School of Computing are available with an optional industrial placement (see p16).

## Computer Science MSc

[www.kent.ac.uk/pg/243](http://www.kent.ac.uk/pg/243)

**Entry requirements:** A first, 2.1 or good 2.2 honours degree (or equivalent) in any subject.

### Course content

- Object-Oriented Programming (CO881)
- Advanced Object-Oriented Programming (CO882)
- Logic and Logic Programming (CO884)
- Project Research (CO885)
- Project and Dissertation (CO880)
- Software Engineering (CO886)
- Systems Architecture (CO883)
- Web-based Information Systems Development (CO887)

One from:

- Computer Graphics and Animation (CO641)
- Data Mining and Knowledge Discovery (CO832)
- Introduction to Intelligent Systems (CO528)

### Module information

Please note that the module lists given here are not fixed, as new modules are always in development and choices are updated regularly. Please see [www.kent.ac.uk/pg](http://www.kent.ac.uk/pg) for the most up-to-date information.

Brief summaries of the modules listed here are given on p11-15. To read a fuller description, go to [www.kent.ac.uk/courses/modules](http://www.kent.ac.uk/courses/modules) and search by the module code or name.



# STUDENT PROFILE

**Ruksar Kachchhi, from India, has a Bachelor's degree in business administration. She is now studying on the conversion Master's degree programme, the Computer Science MSc.**

## **Why did you decide to study a conversion Master's in Computing?**

Although I enjoyed studying Business Administration, I didn't feel it was something I wanted to do for the rest of my life. I have always loved computers and I learned the basics of various languages when I was in school, but I never thought of it as a career choice. Then, my brother persuaded me to learn Java for Android development. I took a few courses on Udacity and started building applications for Android. The thrill and excitement that I felt when I made my first app made me realise that this is something that I would love to do for my entire life.

## **And why did you choose to come to Kent?**

I came to the UK to visit my sister, and I was looking for a good university to do a Master's in computer science. I visited the University of Kent on an open day and got the opportunity to discuss my plans with one of the lecturers here. I took a walk around the university campus and I truly felt that this is the place I would want to be.

## **What kind of academic support do you receive? How easy has it been to start studying a new discipline at postgraduate level?**

All the lecturers have been very considerate and forthcoming when approached with a problem. While it is natural to feel intimidated when entering a new field, my experience at the University of Kent has indeed changed my outlook. I do not feel that doing a Master's in a new discipline is a mammoth task.

## **Which part of the course are you finding most enjoyable?**

I love doing the assessments as they help me understand and practise everything that I have learned during the lectures.

## **What are the other students on your course like?**

There are students from various backgrounds. One of my friends has a Bachelor's degree in physics, another one has a Bachelor's in business administration like me. Everyone is very friendly and we all help each other.

## **Are you planning to do an industrial placement?**

Yes, I will be doing an industrial placement as part of my course. I haven't yet decided where to apply though – there are so many possibilities! I am very excited about it and I am looking forward to it.



## **How do you think this MSc will benefit you in your career?**

I want to be a data scientist and I think that this Master's degree will give me the essential skills I require to get into the field.

## **What advice would you give to anyone considering this programme?**

I would recommend getting some basic training in programming prior to joining the University. Also, I have noticed that students are often reluctant to ask questions. Computer programming is such a varied field – there are always going to be things you want to know and if you don't ask it impedes your ability to succeed.

# ADVANCED MASTER'S DEGREES

**These programmes are for students who have studied computing at honours degree level and wish to extend their knowledge.**

## Module information

Please note that the module lists given here are not fixed, as new modules are always in development and choices are updated regularly. Please see [www.kent.ac.uk/pg](http://www.kent.ac.uk/pg) for the most up-to-date information.

Brief summaries of the modules listed here are given on p11-15. To read a fuller description, go to [www.kent.ac.uk/courses/modules](http://www.kent.ac.uk/courses/modules) and search for the module code or name.

## Advanced Computer Science MSc

[www.kent.ac.uk/pg/246](http://www.kent.ac.uk/pg/246)

**Entry requirements:** A first, 2.1 or good 2.2 honours degree (or equivalent) in computing or a related subject.

This flexible programme offers a largely free choice of modules from those offered on our range of Advanced Master's programmes. It is likely to appeal to computing graduates whose interests span more than one specialism and/or those seeking the freedom to explore a variety of advanced topics. Depending on the programme and the options chosen, this programme can serve as a springboard for employment or research.

## Course content

- Advanced Java for Programmers (CO871)
- Project Research (CO885)
- Project and Dissertation (CO880)
- Six modules from a wide range available across the Advanced Master's programmes

## Advanced Computer Science (Cloud Computing and Big Data) MSc

[www.kent.ac.uk/pg/1211](http://www.kent.ac.uk/pg/1211)

**Entry requirements:** As for Advanced Computer Science.

This programme combines a wide choice of advanced topics in computer science with specialist modules relating to cloud computing and big data. The programme is aimed at graduates considering a career in research and development. It would also provide an excellent foundation for PhD study.

## Course content

- Advanced Java for Programmers (CO871)
- Cloud Computing (CO846)
- Data Mining and Knowledge Discovery (CO832)
- Data Science (CO839)
- Project Research (CO885)
- Project and Dissertation (CO880)
- Up to three optional modules from the MSc in Advanced Computer Science

## Advanced Computer Science (Computational Intelligence) MSc

[www.kent.ac.uk/pg/249](http://www.kent.ac.uk/pg/249)

**Entry requirements:** As for Advanced Computer Science.

This flexible programme combines a wide choice of advanced topics in computer science with specialist modules relating to computational intelligence, including logic-based, connectionist and evolutionary artificial intelligence, inspirations from the natural world, practical applications and the philosophy of machine reasoning.

The programme is aimed at graduates considering a career in research and development. It would also provide an excellent foundation for PhD study.

## Course content

- Advanced Java for Programmers (CO871)
- At least two from: Cognitive Neural Networks (CO836); Data Mining and Knowledge Discovery (CO832); Logic and Logic Programming (CO884); Natural Computation (CO837)
- Project Research (CO885)
- Project and Dissertation (CO880)
- Up to four optional modules from the MSc in Advanced Computer Science





## Advanced Software Development MSc

[www.kent.ac.uk/pg/251](http://www.kent.ac.uk/pg/251)

**Entry requirements:** A first, 2.1 or good 2.2 honours degree (or equivalent) in computing or a related subject with a substantial coverage of programming and software engineering.

This highly practical programme is for computing graduates seeking careers as professional software engineers and it equips them with the skills necessary to succeed. Employers often complain that computing graduates lack real-world practical skills. This programme addresses software development for modern platforms

such as wireless devices, multi-core processors and cloud computing. Modern development environments, languages and tools are also covered.

### Course content

- Advanced Java for Programmers (CO871)
- Cloud Computing (CO846)
- Concurrency and Parallelism (CO890)
- Development Frameworks (CO894)
- Internet of Things and Mobile Devices (CO838)
- Project Research (CO885)
- Project and Dissertation (CO880)
- Plus two optional modules from the MSc in Advanced Computer Science

## Computer Security MSc

[www.kent.ac.uk/pg/254](http://www.kent.ac.uk/pg/254)

**Entry requirements:** As for Advanced Computer Science.

Computer security remains a hot topic in the media and there is strong demand for graduates with technical skills in this area. This programme addresses computer and information security holistically because vulnerability in any one component can compromise an entire system. This includes computer architectures, operating systems, network technologies, data storage and software development processes. A wide range of threats and other security issues (for example, denial-of-service attacks,

# ADVANCED MASTER'S PROGRAMMES (CONT)

hacking, viruses and worms) are covered along with defences and countermeasures.

## Course content

- Advanced Java for Programmers (CO871)
- Computer Security (CO876)
- Networks and Network Security (CO874)
- Project Research (CO885)
- Project and Dissertation (CO880)
- System Security (CO899)
- Trust, Security and Privacy Management (CO834)
- Two optional modules from our other Advanced Master's programmes or from the MSc in Information Security and Biometrics, which we offer in conjunction with the School of Engineering and Digital Arts (for more details, see [www.kent.ac.uk/pg/256](http://www.kent.ac.uk/pg/256))

## Cyber Security MSc

[www.kent.ac.uk/pg/1225](http://www.kent.ac.uk/pg/1225)

**Entry requirements:** A first, 2.1 or good 2.2 honours degree (or equivalent) in computing or a related subject with a strong background in programming.

On this programme, you learn the essential skills to support cyber security within commercial and government organisations. This includes the technical side of encryption, authentication, biometrics and network security, as well as information security management and cyber security risk.

The programme has received provisional certification from GCHQ, the British security and intelligence agency. This MSc is aimed at computing graduates with strong programming skills who are seeking careers as cyber-security professionals or careers that need a systematic and deep understanding of the subject. It would also be an excellent starting point for those wishing to carry out further research in cyber security.

## Course content

- Advanced Network Security (CO892)
- Computing Law (TBC)
- Computer Security (CO876)
- Image Analysis with Security Applications (EL844)
- Networks and Network Security (CO874)
- Project Research (CO885)
- Project and Dissertation (CO880)
- System Security (CO899)
- Trust, Security and Privacy Management (CO834)

## Networks and Security MSc

[www.kent.ac.uk/pg/259](http://www.kent.ac.uk/pg/259)

**Entry requirements:** As for Advanced Computer Science, p8.

This programme provides a broad coverage of computer networks, computer security and wireless device technologies. It looks in depth at some of the security issues that affect fixed and wireless networks, and the current solutions employed to address these problems.

This programme appeals to graduates seeking careers in the network or network security industries, or those who wish to carry on with this topic as an area of research.

## Course content

- Advanced Java for Programmers (CO871)
- Advanced Network Security (CO892)
- Computer Security (CO876)
- Internet of Things and Mobile Devices (CO838)
- Networks and Network Security (CO874)
- Project Research (CO885)
- Project and Dissertation (CO880)
- Two optional modules from our other Advanced Master's programmes or from the MSc in Information Security and Biometrics, which we offer in conjunction with the School of Engineering and Digital Arts (for more details, see [www.kent.ac.uk/pg/256](http://www.kent.ac.uk/pg/256))

# TAUGHT MODULES

**Our degrees are designed to ensure you acquire the essential knowledge you require in your chosen specialism but also have flexibility to choose modules that reflect your particular interests.**

## Module information

Please note that the module information given here is not fixed, as new modules are always in development and choices are updated regularly. Please see [www.kent.ac.uk/pg](http://www.kent.ac.uk/pg) for the most up-to-date information.

To read a fuller description of the modules listed here and any prerequisites, go to [www.kent.ac.uk/courses/modules](http://www.kent.ac.uk/courses/modules) and search by the module code or name.

## Programming modules

### Object-Oriented Programming

**Module code:** CO881

This module introduces you to object-oriented programming using the popular Java language. It is designed for beginners who have not studied computer programming before. By the end you will be able to develop simple programmes using Java.

(Note: students with substantial prior experience of programming take CO871 Advanced Java for Programmers instead.)

### Advanced Object-Oriented Programming

**Module code:** CO882

This module covers the design and implementation of high-quality software using object-oriented techniques. Systems are modelled as configurations of objects communicating with one another. Techniques are introduced which allow objects to play different roles within a system. These concepts are key to the support for adaptation and reuse that object-oriented programming provides. Emphasis is placed on gaining a deep understanding of these concepts and applying them in practice by developing programs in Java. You also explore software component frameworks that support the structuring and manipulation of data (structures and algorithms).

### Advanced Java for Programmers

**Module code:** CO871

This module is for well-qualified computer science students entering the MSc programme from a range of backgrounds. You will already have strong programming skills but will not necessarily have used Java or another object-oriented language extensively. This module develops you as a reflective programmer and seeks to ensure that you have the Java and object-oriented design skills necessary for the rest of your programme.

## Other modules

### Advanced Network Security

**Module code:** CO892

In this model you explore aspects of email security. Content includes: spam – why it exists, targeted spam and filtering systems; phishing attacks, how to block fake sites and install browser-based defences; email-based malware and the defences against this. You study intrusion detection, prevention systems, honey pots and denial of service, methods to detect complex denial of service attacks and defences against them. You also cover eavesdropping and security in wireless networks, and the use of router-based firewalls as a method to protect intranets.

### Cloud Computing

**Module code:** CO846

This module provides an overview of web services and their use in grid/cloud computing. You explore the differences and relationships between grid and cloud computing, the use of virtualisation technologies in cloud computing, and security issues that may affect these environments. You also learn the use of a range of open source tools to create and manage grid and cloud infrastructures.

## TAUGHT MODULES (CONT)

### Cognitive Neural Networks

**Module code:** CO836

This module places neural networks in a historical perspective related to symbolic approaches and in the context of the artificial intelligence hypothesis. The idea of the components of a neuron as a 'detector' is developed. Neural networks are explained in terms of the biology of the brain at a cellular electro-transmission level. The module provides a general framework for neural network architectures at an abstract level and in terms of networks in the cortex. A simple Hebbian model of learning is set out, and other models of unsupervised learning are introduced. Error-driven task learning is outlined, and the delta rule and back propagation

presented. The generalised recirculation algorithm is introduced and its mathematical formulation and properties discussed.

### Computer Graphics and Animation

**Module code:** CO641

Computer graphics and animation are important for a variety of technical and artistic applications including web design, human-computer interaction (HCI) and graphical user interface (GUI) development, games and simulations, digital photography and cinema, medical and scientific visualisation and so on. This module introduces the subject from the perspective of computing. You learn about technologies and techniques for modelling, manipulating,

capturing, displaying and storing 2D and 3D scenes, digital images, animations and video. You also gain practical experience of 3D modelling tools.

### Computer Security

**Module code:** CO876

You study cryptographic algorithms including symmetric and asymmetric techniques and the distinction between encryption and signatures and look at security mechanisms that are used with operating systems and the common criteria for evaluation. The module considers the problems of network security including wiretap, replay, masquerade and denial of service and the mechanisms to provide security such as firewalls and VPNs, and the problem of viruses and





worms. You also look at digital rights management systems using digital watermarking techniques and the security of IEEE 802.11 networks, such as Wi-Fi.

### Concurrency and Parallelism

**Module code:** CO890

Concurrent design and programming skills are of growing importance as multicore processor technology advances. A sound understanding of fundamental concurrency concepts and obstacles is essential. This module introduces fundamental theories of concurrency. It discusses how designs can be made parallel and identifies the common faults in concurrent programs and how to avoid them. You are introduced to a range of widely used programming paradigms and techniques for writing concurrent programs.

### Data Mining and Knowledge Discovery

**Module code:** CO832

This module explores a range of data mining and knowledge discovery techniques and algorithms. You learn about the strengths and weaknesses of different techniques and how to choose the most appropriate for any particular task. You use a state-of-the-art data-mining tool, and learn to evaluate the quality of discovered knowledge.

### Data Science

**Module code:** CO839

The amount of data generated worldwide is more than doubling every year. Traditional data analysis techniques are inadequate for dealing with the vast ocean of data. This module introduces modern techniques, platforms and tools for analysing large data sets efficiently, along with key applications. It aims to equip students to join the new generation of data scientists sought after by industry and academia.

### Development Frameworks

**Module code:** CO894

This module examines software development environments and the facilities they provide. The module outlines the development of simple applications in these environments, software libraries and frameworks, and their use in developing and testing software systems. You use development frameworks' facilities for project and source-code management, automated testing, refactoring and profiling and learn how to deploy applications across multiple platforms using installers and build-systems.

### Internet of Things and Mobile Devices

**Module code:** CO838

The module covers a mixture of theoretical and practical topics in the area of mobile devices and the Internet of Things (IoT), that is, the use of internet technologies to access and interact with objects in the physical world. This includes coverage of the range of sensor

and actuator devices available, ways in which they communicate and compute, methods for getting information to and from IoT-enabled devices, ways of visualising and processing data gained from the IoT, and associated privacy and security issues. A practical component consists of building the hardware and software for a sensor network and a system to visualise data from that network. Application development for mobile devices such as smartphones are introduced using a popular mobile platform.

### Introduction to Intelligent Systems

**Module code:** CO528

This module covers the basic principles of machine learning and the kinds of problems that can be solved by such techniques. You learn about the philosophy of AI, how knowledge is represented and algorithms are used to search state spaces. It is also an introduction to both machine learning and biologically inspired computation.

### IT Consultancy Practice 2

**Module code:** CO645

Students taking this module undertake one or, typically, more assignments for Kent IT Consultancy (KITC). You learn to formulate and evaluate technical alternatives to meet IT requirements of small businesses including issues of integration with existing technologies and procedures, maintenance and expansion.

## TAUGHT MODULES (CONT)

Working under supervision, you estimate time and costs involved in devising solutions to small-scale IT-based problems in small business situations. Assessment is 100% project-based. (See p20 for further information about working as a consultant in KITC.)

### Logic and Logic Programming

**Module code:** CO884

There are four main components to this module, several of which are at the forefront of the academic discipline and are informed by research. These are:

- propositional and predicate logic, and resolution – this looks at the formal languages of propositional logic and predicate logic and the role of resolution in theorem proving and logic programming
- prolog programming – this is an introduction to the programming language and the concept of declarative coding
- search techniques – this uses generic search algorithms that are widely applied in solving computationally hard problems
- constraint logic programming – this shows how constraint satisfaction is useful in search and how this emerging paradigm fits with logic programming.

### Natural Computation

**Module code:** CO837

This looks at the increasing use of nature-inspired computational techniques in computer science. These include the use of biology as a source of inspiration for solving computational problems, the application of artificial intelligence

techniques to various problems, and the use of physical, chemical and biological systems to construct computers.

### Networks and Network Security

**Module code:** CO874

You review network techniques, switching and multiple access and look at high-speed local area networks and network protocols, including data link, transport and application layers. You look at real-time data transmission and quality of service; naming and addressing, including material on the domain name system, dynamic IP address allocation and address translation systems. Firewalls, layer 3 network security and recent developments are also covered. The nature of the topic changes

from year to year and is addressed principally by research seminars and student-centred research.

### Project and Dissertation

**Module code:** CO880

Students choose their project near the beginning of their second term, in co-ordination with the Project Research module (CO885, see p15). The School usually suggests projects, a number of which may involve industrial collaboration.

You may propose a project of your own if a suitable member of academic staff is available to supervise. The project must be appropriate for, and relevant to, your programme of study. The project examines your ability to understand and expand on



a specific technical problem, and to carry out investigations and practical work, including programming. You also have to be able to describe results, draw conclusions from them and write a coherent, well-organised dissertation.

### Project Research

**Module code:** CO885

The crowning element of most Master's degrees is the project and dissertation in which you apply a wide range of skills learned in the taught modules to an interesting research problem or practical application of your choice. This module provides useful transferable skills for completing the project, and supports you in some preparatory tasks such as literature study and project planning.

### Software Engineering

**Module code:** CO886

This module takes a wider view of the software development process, with an emphasis on techniques and procedures for ensuring high product quality. A key topic is the use of the Unified Modelling Language (UML) for problem analysis and software design. Towards the end of the module, you have an opportunity to put theory into practice by undertaking a group project, with another group as your customer.

### System Security

**Module code:** CO899

You look at federated identity management, privacy protection; viruses and worms and hacking. The module also covers secure architectures; formal verification methods and email security, such as SMTP-MIME and S/MIME. You study secure software development methods and tools, common criteria, code inspections, code coverage tools and code evaluation.

### Systems Architecture

**Module code:** CO883

This module provides an understanding of the basic principles of computer architecture. It includes the fundamental ideas of computer hardware such as Boolean algebra; binary and hexadecimal numbers and data representation; bits, bytes and character codes; memory, and peripherals; registers, RAM and ROM. It also offers a practical introduction to the use of a UNIX-like operating system and you learn the principles and mechanisms of operating systems including memory management, swapping, virtual memory, file systems and local and remote file access.

### Trust, Security and Privacy Management

**Module code:** CO834

This module investigates the process of security management. You take a holistic view of security management, starting with risk management and the formulation of security policies. Technical subjects

include a description of the various security models, showing how authorisation policies can be automatically enforced. The legal and privacy issues associated with information management are also addressed, as are the usability issues of security technologies. The module concludes by investigating how security has been inbuilt into some existing applications, and how security issues will affect the uptake of ubiquitous computing systems.

### Web-based Information Systems Development

**Module code:** CO887

Web-based information systems form the heart of e-commerce. They are also increasingly the way businesses handle all their information needs. Building such systems requires an understanding of up-to-date tools and technologies such as XML, UML, Java and databases; it also calls for an understanding of how to design systems that genuinely meet user and business needs. This module starts by examining the business context of web-based information systems. It introduces design methodologies and techniques, using UML in recording requirements. Systems implementation involves database management systems and these are studied in some depth. By the end of the module, you have developed a complete information system which uses XML and Java to link dynamic web pages to a database back-end.

# INDUSTRIAL PLACEMENT

**An industrial placement is an ideal way to gain workplace experience, make useful contacts and develop an understanding of graduate careers in computing and IT.**

On a placement, you have an opportunity to work in technical and business roles, putting into practice the knowledge you have gained on your MSc programme and developing new skills. The experience you gain can give you an extra edge when applying for jobs in the future.

All full-time taught Master's programmes in the School of Computing can be combined with an industrial placement of between eight and 50 weeks. Students usually start their placement as soon as their dissertation has been submitted in September.

## Industrial placement support

In the School of Computing we have a specialist team to assist you in finding a placement and providing support while you are there. We draw on our well-established networks to organise employer presentations and opportunities for you to meet with recruiters, as well as advising you on how to tailor your application and prepare for interviews. During your placement we keep in contact with you and offer support during the year.



## Our links with industry

Our students have worked in the UK, the US, Asia and continental Europe, and our placement team has links with numerous organisations, including:

- Accenture
- ASOS
- BAE Systems
- Boeing
- BT
- Cancer Research
- Cisco
- HSBC
- Kent Police
- Lilly
- Met Office
- Microsoft
- Morgan Stanley
- Sky
- The Walt Disney Company.

## Salaries

The average placement salary outside London is £16,500. In London, salaries generally range from £17,000 to £22,000 while some, depending on the employer, are over £30,000.

### DID YOU KNOW?

If you are an international student, your student visa covers your entire course, including your industrial placement. So you can work full-time and earn money during your placement period.



# PLACEMENT PROFILE

**Peter A. A. Asomoah, from Ghana, is undertaking an industrial placement with Influential Software as part of his MSc in Computer Science.**

## What does your placement involve?

I'm a software developer intern and I work as part of the Microsoft.NET development team. I'm assigned tasks that may involve writing code to add features for ongoing projects, or preparing technical documents. I've been able to work with and learn new forms of technology, and gained practical experience of front-end, back-end and database development. I've also had the chance to contribute to commercial projects, which has helped me to gain practical

experience of software engineering processes, especially the agile development process.

## How do you think the placement will benefit you?

Overall, the placement has expanded my knowledge in relation to the modules I covered during my programme. It has put me on course to becoming a full stack developer, since I've had the chance to work with all the technologies involved. Also, it's helped me to refine my career choices in terms of the aspect of software development I'd like to focus on.

## What kind of support did you get from the School to set up your placement?

The School placement office sent out regular emails about companies offering placements and application

deadlines. They held sessions for us to meet employers. They also offered career advice and you could ask them to review your CV and cover letter, too.

## What advice would you give to someone thinking of doing a placement?

Placements are very effective in helping to bridge the gap between what is taught on your course and what to expect when you start a career. It will be more effective if you can get a placement with a company involved in the area you are most interested in. It helps if you can learn a bit about the technology stack the company uses before you start, too. This will help you to have a shorter learning period and get the best out of your placement.

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## Matthew Gould is Head of Java Services at Influential Software.

Influential has been recruiting placement students for six years, most of them from the University of Kent. We've always found their technical aptitude and attitude has enabled them to become productive members of staff in a very short space of time.

All our placement students are assigned a mentor on their first day to act as a first point of contact. New starters are quickly working

on client projects where tasks are clearly defined and broken down to ease them into the world of work. Colleagues at Influential are very supportive and keen to share knowledge, which fosters a collaborative atmosphere.

The School gives us clear criteria for evaluating a placement. This helps us to develop a learning plan and give the best experience possible to our placement students. The School visits all placement students and confirms that the process is working well and that everyone is enjoying the experience.

Placement students have formed a core recruitment strategy for the company and this has allowed it to expand rapidly while maintaining exceptional standards of quality. If you're not sure whether to take up a placement opportunity, I would say – do it! The skills you learn in the workplace build on the foundations laid at university and allow you to see the theory in practice. Being able to apply your knowledge and seeing end users utilising your work and giving feedback on it is incredibly satisfying. Be prepared to learn and throw yourself into anything.

# OUR RESEARCH EXPERTISE

**The School of Computing carries out wide-ranging research within focused research groups. It provides a vibrant, intellectually stimulating environment in which to carry out your studies.**

## Computing Education Group

We focus on disciplinary-specific pedagogy, especially the teaching and learning of computer science and programming. Our research interests focus on understanding the aspects of learning that are specific to computing education, and which range from examining general theories of learning, through thematically focused investigations (such as gender), to tool construction. We examine education from multiple aspects, including supporting computing education research infrastructure, working with teachers, or focusing on student learning.

## Computational Intelligence Group

This Group brings together interdisciplinary researchers investigating the interface between computer science and the domains of bioscience and cognition. In terms of applying computation to other domains, we have experts in investigating the modelling of gene expression and human attention, emotions and reasoning.

From the perspective of applying biological metaphors to computation, we research new computational methods such as genetic algorithms and swarm intelligence.

The Group also develops novel techniques for data mining, visualisation and simulation. These use the results of interdisciplinary research for finding solutions to computationally expensive problems.

The Group has strong links with other schools at the University of Kent, as well as with universities, hospitals and scientific research institutes throughout the country and internationally.

## Data Science Research Group

Data Science is an interdisciplinary field that utilises computing technology to derive obvious and non-obvious relationships in data by developing the appropriate scientific algorithms and implementation of these methods to extract useful knowledge or insights from the data.

The focus of the Data Science Research Group at Kent is to apply the techniques such as signal processing, machine learning, security and statistics in an impactful manner to benefit the wider public. Our research is cross-disciplinary, involving schools such as Business, Computing, Engineering, Pharmacy, Psychology, Sociology and Sports Science.



## Programming Languages and Systems Group

Our research involves all aspects of programming languages and systems, from fundamental theory to practical implementation. The Group has interests across a wide range of programming paradigms: object-oriented, concurrent, functional and logic. We research the links between logic and programming languages, the verification of the correctness of programs, and develop tools for refactoring, tracing and testing. We are interested in incorporating safe concurrent programming practices into language design.

The Group is also interested in practical implementation of programming languages, from concurrent parallel processing to battery-operated mobile systems. Particular research topics include lightweight multi-threading kernels, memory managers and garbage collectors.

## Security Group

This Group is leading the University's Interdisciplinary Research Centre in Cyber Security, see [www.cyber.kent.ac.uk](http://www.cyber.kent.ac.uk)

The University was recognised as an Academic Centre of Excellence in Cyber Security Research in 2015-2017 by GCHQ and the Engineering and Physical Sciences Research Council (EPSRC).

Security of computer systems and the information held on them is becoming even more important as a consequence of society's increased reliance on electronic devices – with most of these holding valuable information or performing critical operations, and connected through networks of some kind.

The Security Group covers a wide range of security topics, including user and device authentication, password and biometrics, access control and identity management, formal verification and testing of security, malware analysis, network and communication security, cloud security, security protocols, social-technical security, human factors, cybercrime, security policies, privacy, ransomware, quantum cryptography, steganography, multimedia security, and AI security.

We have a strong involvement with postgraduate teaching in the MSc programmes in Cyber Security, Computer Security, Information Security and Biometrics, and Networks and Security. Our MSc in Cyber Security is provisionally accredited by GCHQ.

Our research contributes to the Research Councils' Partnership for Conflict, Crime and Security Research (PaCCS) and EPSRC's cross-ICT priority area Safe and Secure ICT.

## Interdisciplinary Research Centre in Cyber Security

The Interdisciplinary Research Centre in Cyber Security at the University of Kent harnesses expertise across the University to address current and potential cyber security challenges.

Our strategic objective is to promote wide-ranging multidisciplinary research, which will help in the teaching and development of skills in cyber security to students and the wider community, through degree programmes, workshops, visits, lectures and training.

Included in our remit is work with external organisations to promote cyber security. The Centre involves 13 academics from two schools (Computing, and Engineering and Digital Arts) as core members, and over 30 further academics from ten schools in two faculties (Sciences, and Social Sciences) as associates. The University has set a plan to further grow the Centre by investing more to support our research.

## RESEARCH EXCELLENCE

In the latest Research Excellence Framework (REF), the research impact of the work within the School was graded as world-leading or internationally excellent.

# EXPLORE AND DEVELOP



**As a postgraduate student at Kent, you have access to a range of facilities to support you as you explore your subject and develop your skills.**

## **Makerspace: The Shed**

Our makerspace, The Shed, supports innovative teaching and learning. The Shed is a large, open-plan workshop area, fitted with equipment including 3D printers, a laser cutter and metal fabrication machinery.

Equipped with a wide variety of machinery and development equipment such as the Oculus Rift and Raspberry Pi, The Shed takes advantage of the increasing accessibility of electronics and

engineering with a rapid prototyping capability. Students and staff can use it to build physical devices for taught modules and to develop their own interests and hobbies.

## **Kent IT Consultancy**

Kent IT Consultancy (KITC) is part of the School of Computing and is run by students at the University. Our student consultants have the opportunity to apply their academic studies and experience in a real-world setting.

Our postgraduates deliver consultancy services that help ambitious local businesses to make better use of technology. For example, our students have helped a local entrepreneur to launch an online clothing store, worked with a local manufacturer to improve

their order fulfilment process, and supported a number of businesses to modernise their websites.

Working as a student consultant with KITC means that you benefit from specific, industry-focused training and support from both academics and professional IT consultants. You also gain academic credit for the work you do, which counts towards your degree. The skills and experience you gain are valuable to employers and help you to stand out from other candidates when applying for jobs.

Securing a position as a student consultant is a competitive process, as there are a limited number of places each year. You can find out more about the role and how to apply at [www.kitc-solutions.co.uk/recruitment](http://www.kitc-solutions.co.uk/recruitment)

# A SUCCESSFUL FUTURE

## A postgraduate qualification from Kent provides you with an impressive portfolio of skills and specialist knowledge.

In addition to the academic knowledge and practical skills you acquire at Kent, we also help you to develop key transferable skills that are essential within the competitive world of postgraduate employment. These include the ability to adapt to challenges, analyse complex real-world problems and develop original ideas that can be applied to all aspects of future work.

## Global Skills Award

The Global Skills Award Programme is designed to broaden your understanding of global issues and current affairs as well as to develop personal skills that will enhance your employability. The programme runs from November to April, and all students registered for a taught Master's degree are eligible to apply for a place.

The programme gives you the opportunity to broaden your experience, gain important skills while you are studying, and meet and network with students from a wide variety of backgrounds and disciplines. For more information, see [www.kent.ac.uk/graduateschool/skills/programmes/gsa.html](http://www.kent.ac.uk/graduateschool/skills/programmes/gsa.html)

## Strong industry links

Within the School of Computing we have strong links with industry, notably with Microsoft, Oracle, IBM, Agilent Technologies, Erlang Training and Consulting, HP Labs, Ericsson and Nexor.

Our industrial placement programme can greatly enhance your studies and has a dramatic impact on your choices after graduation. The industrial placement programme is available to all taught Master's students in the School of Computing (see p16). The School has a specialist placement team to assist you, as well as an employability co-ordinator.

## Further study

If you are interested in studying for a PhD or a research Master's degree, we offer a thriving academic community and support to help you to become an effective researcher.

In the most recent Research Excellence Framework, computer science and informatics at Kent was ranked 12th in the UK for research intensity by the *Times Higher Education* (THE).

The School also scored highly in the most recent national Postgraduate Research Experience Survey: 90% of respondents expressed satisfaction with the quality of our supervision, and 90% stated that their overall experience either met or exceeded their expectations.

A full-time PhD requires a minimum of three years' work; an MSc research degree can be completed in one year. To apply, you need a good honours degree (first or 2:1) or a Master's degree at merit or distinction (or the equivalent) in computer science or a related discipline (such as mathematics, business studies or electronics, as long as the degree has a strong computing component). You also need an idea for a project, or an area you wish to work in. Your research should produce an original contribution in your chosen field of study.

To find out more, please contact the School of Computing (see p23).

## Careers and Employability Service

The University's award-winning Careers and Employability Service can help you to plan for your future by offering one-to-one advice at any stage in your postgraduate studies. It also provides online advice on employability skills, career choices, applications and interview skills.

## Further information

For more information on the careers help we provide at Kent, visit our Employability web page at [www.kent.ac.uk/employability](http://www.kent.ac.uk/employability)



# APPLICATIONS AND FUNDING

## Entry requirements

If you would like to apply for a postgraduate degree, you must normally have achieved either a first or second class result in a related subject at undergraduate level. We are pleased to consider equivalent qualifications from internationally recognised non-UK institutions – for more information on grading equivalents, please visit [www.kent.ac.uk/internationalstudent/entry-requirements](http://www.kent.ac.uk/internationalstudent/entry-requirements)

Please refer to p6 and p8-10 for the specific entry requirements for our degree programmes in the School of Computing.

## English language requirements

The University requires all non-native speakers of English to reach a minimum standard of proficiency in written and spoken English before beginning a postgraduate degree.

Minimum standards:

- IELTS – 6.5, including 6.0 in reading and writing, and 5.5 in listening and speaking
- Pearson Test of English Academic – 62, including 60 in each subtest
- Cambridge English: Advanced and Proficiency – 176, including minimum of 169 in reading and writing and 162 in speaking and listening
- Internet-based TOEFL – 90 including minimum of 22 in reading, 21 in writing, 17 in listening and 20 in speaking

See [www.kent.ac.uk/courses/postgrad/apply](http://www.kent.ac.uk/courses/postgrad/apply)

## How to apply

We only accept online applications. To apply, select the programme that you wish to study and click on 'apply'. See [www.kent.ac.uk/courses/postgrad/apply](http://www.kent.ac.uk/courses/postgrad/apply)

Taught postgraduate degrees begin in September. International students must apply by 31 July. There is no fixed deadline for Home/EU students but places are subject to availability so we recommend you apply as early as possible.

## Scholarships from the School of Computing

The School of Computing offers a number of scholarships for its taught Master's students, as outlined below.

### Home/EU students

A limited number of scholarships are available for Home/EU students who meet the general award criteria. These scholarships are allocated on a first-come-first-served basis according to the date we receive the funding request.

### International (non-EU) students

International (non-EU) students who meet the general award criteria are guaranteed to receive scholarship funding in the form of a discount on standard international tuition fees.

For more information, see [www.cs.kent.ac.uk/masters/scholarships.html](http://www.cs.kent.ac.uk/masters/scholarships.html)

## Other scholarships for postgraduate students

Students who graduate with an honours degree from the University of Kent and opt to go straight on to a Master's programme are eligible for the Graduate School Scholarship, which offers a reduction in tuition fees. For details see [www.kent.ac.uk/scholarships/postgraduate](http://www.kent.ac.uk/scholarships/postgraduate)

To explore the full range of scholarships offered at the University of Kent for taught Master's students, eligibility criteria and details of how to apply, visit [www.kent.ac.uk/scholarships/search](http://www.kent.ac.uk/scholarships/search)

## Scholarship application deadlines

The deadlines for applying for School of Computing and University scholarships can vary, so please check the School and University websites for up-to-date information.

### DID YOU KNOW?

You can enrol for a pre-session course at Kent if you need to improve your English language skills. Find out more at [www.kent.ac.uk/international-pathways/pre-session/index.html](http://www.kent.ac.uk/international-pathways/pre-session/index.html)

# GENERAL INFORMATION

## The University of Kent is dedicated to excellence in both teaching and research.

In the most recent Research Excellence Framework, Kent was ranked in the top 20 for research intensity in the *Times Higher Education*, outperforming 11 of the 24 Russell Group universities.

## Strong academic community

Kent's postgraduate students are part of a thriving intellectual community. In addition to lectures and seminars, you benefit from a rich and stimulating research culture.

## A global outlook

Kent has a great international reputation, attracting academic staff and students from around the world. Our academic schools are engaged in collaborative research with universities worldwide and we offer a range of opportunities to study abroad and an approach that is truly global.

## European connections

The University has two main UK campuses, Canterbury and Medway, located in the south-east of England, close to London. We also have study locations in Brussels, Paris, Athens and Rome. We have a diverse, cosmopolitan population with 157 nationalities represented. We also have strong links with universities in Europe. From Kent, you are two hours away from Paris and Brussels by train.

## Visit us

Come to one of our open days to find out more about postgraduate study at Kent. Our postgraduate open days are an opportunity to talk to academic staff and find out about accommodation and current funding opportunities. To find out more, see [www.kent.ac.uk/courses/visit](http://www.kent.ac.uk/courses/visit)

## Further information

For information about applying to Kent, or to order a copy of the *Graduate Prospectus*, please contact:  
Recruitment and Admissions Office,  
The Registry, University of Kent,  
Canterbury, Kent CT2 7NZ, UK  
T: +44 (0)1227 768896  
E: [admissions@kent.ac.uk](mailto:admissions@kent.ac.uk)

### Location

Canterbury and Medway

### Faculty

Faculty of Sciences

### School

School of Computing

### Contact

School of Computing,  
University of Kent,  
Canterbury,  
Kent CT2 7NF, UK

T: +44 (0)1227 824520

E: [computing@kent.ac.uk](mailto:computing@kent.ac.uk)

### Applications

#### Taught programmes

Online at  
[www.kent.ac.uk/courses/postgrad/apply](http://www.kent.ac.uk/courses/postgrad/apply)

#### Research programmes

See p21 or contact the School for further details.

This brochure was produced in February 2018. The University of Kent makes every effort to ensure that the information contained in its publicity materials is fair and accurate and to provide educational services as described. However, the courses, services and other matters may be subject to change. For the most up-to-date information, see [www.kent.ac.uk/pg](http://www.kent.ac.uk/pg) and for full details of our terms and conditions, see [www.kent.ac.uk/termsandconditions](http://www.kent.ac.uk/termsandconditions)

For the University to operate efficiently, it needs to process information about you for administrative, academic and health and safety reasons. Any offer we make to you is subject to your consent to process such information and is a requirement in order for you to be registered as a student. All students must agree to abide by the University rules and regulations at: [www.kent.ac.uk/regulations](http://www.kent.ac.uk/regulations)

# / COME AND MEET US

To find out more about visiting the  
University, see our website  
[www.kent.ac.uk/visit](http://www.kent.ac.uk/visit)