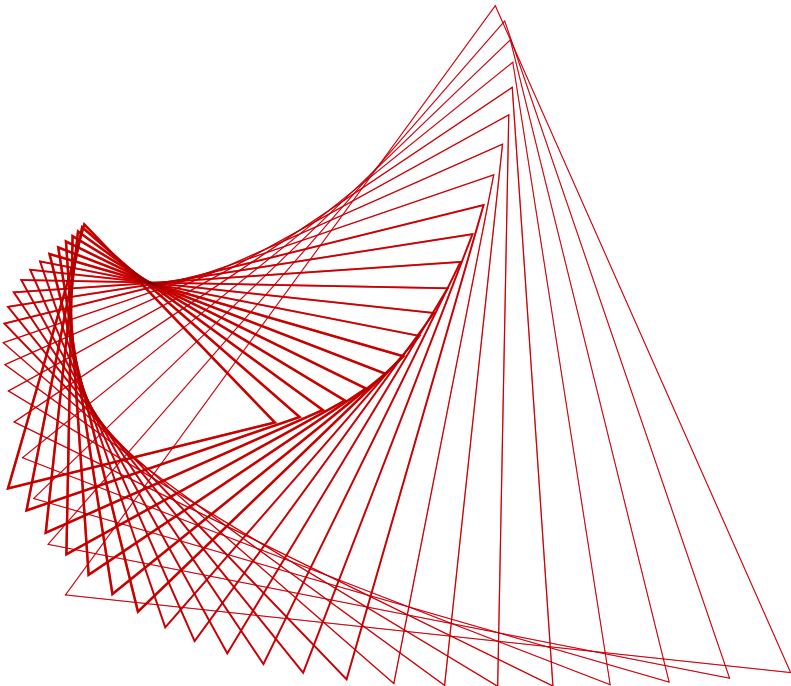


# Communication Systems

## Postgraduate Programmes 2010



# Communication Systems

MSc

## Communications Networks and Software

MSc

## Mobile Communications Systems

MSc

## Mobile and Satellite Communications

Mobile and satellite communications and Internet-based networking are now an essential part of life. Long term, we expect to see the development of infrastructure-less networks that support wireless handheld devices, bringing us closer to ubiquitous wireless communications.

Mobile telephony is reaching saturation in the most technologically advanced countries and is rapidly becoming the main telecommunication infrastructure in the rest of the world. Our MSc Mobile Communications Systems gives you a thorough understanding of the engineering aspects of this rapidly developing field.

Mobile communications provide terrestrial coverage in densely populated areas, while satellite communications enable wireless communication in regions where mobile networking is not cost-effective. Our MSc Mobile and Satellite Communications gives you an in-depth understanding of the engineering aspects of these important technologies.

We are placing ever greater demands on the Internet, and traditional telecommunication infrastructures are migrating to Internet-based architectures and protocols. Our MSc Communications Networks and Software covers the key aspects of the changing Internet environment, in particular the convergence of computing and communications underpinned by software-based solutions.

## MSc Communications Networks and Software

### Compulsory Modules

- Data and Internet Networking
- Network and Service Management
- Object-oriented Design and C++
- Principles of Telecommunications and Packet Networks

### Optional Modules (select four)

- Advanced Signal Processing
- AI and AI Programming
- Mathematics of Signal Processing
- Mobile Applications and Web Services
- Mobile Communications A
- Mobile Communications B
- Multimedia System and Component Technology
- Operating Systems for Mobile Systems Programming

## MSc Mobile Communications Systems

### Compulsory Modules

- Data and Internet Networking
- Digital Communications
- Mobile Communications A
- Mobile Communications B
- Principles of Telecommunications and Packet Networks

### Optional Modules (select three)

- Advanced Signal Processing
- Data and Internet Networking
- Mathematics of Signal Processing
- Mobile Applications and Web Services
- Network and Service Management and Control
- Operating Systems for Mobile Systems Programming
- Principles of Telecommunications and Packet Networks
- RF Systems and Circuits

## MSc Mobile and Satellite Communications

### Compulsory Modules

- Digital Communications
- Mobile Communications A
- Mobile Communications B
- Satellite Communications A
- Satellite Communications B

### Optional Modules (select three)

- Advanced Signal Processing
- Data and Internet Networking
- Mathematics of Signal Processing
- Mobile Applications and Web Services
- Network and Service Management and Control Programming
- Operating Systems for Mobile Systems Programming
- Principles of Telecommunications and Packet Networks
- RF Systems and Circuits

“Mobile and satellite communications and Internet-based networking are now an essential part of life.”

## Factfile

### Typical entry requirements

A good honours degree in mathematics, computing, physical sciences or engineering disciplines. Our normal entry level is a minimum of a Lower Second or equivalent; however, with industrial experience, we can be flexible in our entry requirements.

### Programme length

12 months full-time, up to 48 months part-time

### Start date

October

### Funding

A few scholarships are available from the Institution of Engineering and Technology (IET) and charitable trusts. There are also Commonwealth scholarships available within the University for overseas students, but these are very competitive and early application is vital.

### Professional recognition

As an IET-accredited institution, our programmes are countable under the continuing professional development (CPD) scheme.

### Programme Directors

Dr Michael Howarth  
(Communications Networks and Software)

Professor Rahim Tafazolli  
(Mobile Communications Systems)

Professor Rahim Tafazolli  
(Mobile and Satellite Communications)

## Contact Details

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### For admissions enquiries:

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## Dissertation and Projects

The projects are a major part of the programme. They are designed to enable you to demonstrate your skills and ability to solve real-life problems, while gaining more detailed knowledge on a particular topic.

Projects can either be carried out within a research group or, when the project is based on a practical problem suggested by industry, at the partner organisation's premises. Participants have worked with INMARSAT, Logica, BT, Astrium, SSTL, Vodafone, Hutchison, O2, Orange, Motorola, Alcatel-Lucent, NEC, Nokia, Aircom, OFCOM and a number of local small companies.

Projects can be theoretical, simulation-based or experimental. In all cases, you are expected to show innovation and an ability to come up with your own solutions.

## Example Projects:

### Capacity Enhancement of Mobile Cellular System Using Pico-Cells

This project aimed to investigate a small cell employing a small base station interconnected using wireless links, resulting in a conference publication and funding for a PhD for the student.

### Carrier and Time Offset Estimation in OFDM 4G Mobile Systems

OFDM systems performance is sensitive to carrier frequency and time estimation errors, particularly at high mobile speed. The project was carried out in the Matlab platform and several estimation techniques were implemented and evaluated under different mobility conditions.

### Handover between WLAN and UMTS Systems

This was a hardware/software-based project using the Surrey wireless test-bed. A handover scheme which uses mobile IP and context transfer was implemented and tested using video streaming, reducing the handover break from several seconds' delay to a sub-second delay.

### Interference Management for Future Mobile Cellular Systems

Part of a large EU-funded project, the work focused on intelligent and distributed (multi-cell) resource management focusing on cell-edge capacity. The project was carried out via computer simulation of mobile systems using and enhancing the existing simulator at Surrey.

### Intra-domain Traffic Engineering for Quality of Service Through Differentiated Routing

This project investigated through software simulation proposals to route traffic along different paths according to their different delay requirements, and showed how different delays could be achieved for different traffic types.

### Satellite Communications with UAVs

This project investigated the use of DVB-RCS at Ka band for theatre of war and environmental monitoring with real-time data requirements.

### Wireless Sensor Networks

This project involved programming several wireless sensor nodes and setting up a wireless sensor network for measuring activities such as room temperature and the presence and activity of people. The wireless sensor network was interconnected with the Surrey IP network test-bed and demonstrated real network performance.

## Facilities, Equipment and Support

We have a full range of software support for assignments and project work, including Matlab/Simulink, C, C++ and up-to-date toolboxes, systems view, OPNET and NS2. You will be able to access system simulators already built in-house, including 3GPP, BGAN, DVB-S2-RCS, GSM, UMTS, DVB-SH, WCDMA, GPRS, WiMAX, LTE, HSPA and HSDPA.

Our Rohde and Schwartz Satellite Networking Laboratory includes DVBS2-RCS generation and measurement equipment and roof-mounted antennas to pick up satellites. A security test-bed also exists for satellite security evaluation.

We have a fully equipped RF lab with network analyser, signal and satellite link simulations. In addition we have a small anechoic chamber for antenna measurements. A wideband MIMO channel sounder is available for propagation measurements.

SatNEX is a European Network of Excellence in satellite communications, and a satellite platform exists to link the 22 partners around Europe. This is used for virtual meetings and to participate in lectures and seminars delivered by our partners.

A fully equipped UHF/VHF satellite ground-station facility is located on campus, which is being expanded to S-band and is supported by the ESA GENSO project. At present the station tracks amateur satellites and CubeSats.

Our wide coverage experimental wireless network test-bed is based on IPv4, and IPv6 for testing new networking protocols for mobility, handover, security, cognitive radio and networking can be carried out. Most networking protocol projects use this test-bed, with the help of PhD students and staff.

We are the only university in the UK that has an IP-Multimedia Subsystem (IMS) test-bed for developing and experimenting advanced mobile/wireless services/applications. You can use this to carry out your services and application-based projects for mobile multimedia, such as multi-mode user interface, service mobility, service discovery and social networking services.

Our wireless sensor test-bed is unique. Advanced routing protocols, middleware architectures, air interface and networking protocols for wireless sensor networks can be developed and tested.

## Teaching

Taught Masters programmes in the Department of Electronic Engineering utilise our research-active staff in conjunction with state-of-the-art facilities to provide a range of learning experiences – lectures, tutorials, directed study, practical laboratories and project work – that prepare graduates for their professional life.

We are particularly keen to develop in all our students a broad range of generic skills to complement the core technical or scientific competencies of their chosen subject area. Our modular programme format, coupled with the increasing use of innovative teaching and learning strategies such as e-learning and industrially focused short courses, provides a flexible study environment whilst maintaining the academic rigour and quality expected of one of the UK's top-rated faculties.

## Links with Industry and International Organisations

The University of Surrey has very close links to communications technology companies who use our MSc programmes as their main training ground. An industrial board also helps us to shape our programmes and views all student project posters, helping to keep our programmes relevant and enabling our students to meet good contacts.

Lectures, visits and projects are provided in association with a large number of key industrial partners. For example, as part of the Satellite Communications A module, there are five industrial lectures to complement the academic presentations, whilst the Mobile Communications B module includes several lectures by the Director of Vodafone Global R&D based on the practical issues involved in running a mobile network.

We have collaborations with organisations in Germany, Greece, France, Italy, Sweden, China, India, Pakistan, Korea, Malaysia, Indonesia and the US.

## Passport to a Career

These MSc programmes provide you with the skills and knowledge to either continue on with research or to find employment with network and service providers, mobile and networking equipment suppliers, mobile telecoms operators, broadcast industry, spectrum regulators and corporations with advanced IT and communication services and networking infrastructures.

The University of Surrey is internationally known for its teaching and research in communications technologies. Our graduates are highly regarded and many now hold major positions in international companies. After your MSc you will be connected into the Surrey network for the rest of your career.



Staff Profile:  
**Professor Rahim Tafazolli**

Professor Rahim Tafazolli is well known internationally in the mobile communications field. He gives lectures and short courses to the UK and international mobile companies on WIMAX, UMTS, GPRS, LTE and Future Internet. He is scientific advisor to many mobile companies and is founder of the IET International Conference on Mobile Technologies. He is regularly invited to international conferences and workshops as keynote speaker. He has edited two books on future mobile technologies and is currently chairman of the EU Expert Group on Mobile Communications.



Staff Profile:  
**Dr Michael Howarth**

Dr Michael Howarth gained his DPhil from Oxford University and then worked initially as a consultant in industry and commerce. He has been a lecturer in the Centre for Communication Systems Research since 2005, where his research interests include traffic engineering, quality of service, security systems and protocol design.

Graduate Profile:  
**Dr Ioannis Mertzanis**  
MSc Mobile and Satellite Communications

The year I spent at the University of Surrey during my MSc course was a full year of training and preparation for my future. Sponsored by an HTNT scholarship, the course combined both academic background work together with practical experience of the real-life problems facing industry.

The work on my MSc project gave me the opportunity to get hands-on experience in different simulation platforms, attend training courses and take my first step in research into telecommunication networks and protocols. It was a really exciting topic for me that led to my MSc graduation with distinction. That's why, after a few years of industrial work, I decided to return to Surrey to do a PhD sponsored by the Centre for Communication Systems Research (CCSR) to work as a research fellow.

During my PhD studies, I had the chance to extend the initial work on my MSc project and work very closely with the biggest industrial players in the field, such as INMARSAT, Astrium (formerly Matra Marconi Space) and Nortel Networks.

After my PhD graduation, I joined Space Hellas SA in Greece, where I worked initially as a project manager, then as R&D Director and am now a General Manager in Commercial and Operations. During this time I have continued to work on projects with CCSR and with many graduates from the course that are working in industry all around Europe.

Graduate Profile:  
**Dr Shahram Ghaheri-Niri**  
MSc Mobile Communications Systems

I graduated from the MSc course in Mobile Communications Systems with a distinction, down to my project on the handover between DECT-GSM systems.

I was so interested in mobile communications and its fast pace of progress that I decided to do a PhD at Surrey. After I obtained my PhD, I joined a small company in Birmingham as a technical expert. Then I was headhunted by Huchison, where I led work on UMTS standards, before joining NEC Europe.

Now after two years at NEC, I am the Director of Technology Strategy, setting the roadmap and vision for the company. I am also leading a large group at NEC where most of my team are graduates from Surrey. I have been very happy with the Surrey graduates, and every year I set a number of MSc projects sponsored by NEC.

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Every effort has been made to ensure the accuracy of the information contained in this brochure at the time of going to press. The University reserves the right, however, to introduce changes to the information given including the addition, withdrawal or restructuring of degree programmes.

March 2010

2316-0310