

# RF and Microwave Engineering Masters/MSc with Industrial Studies

## Postgraduate degree programme RF and Microwave Engineering Masters/MSc with Industrial Studies:

This programme provides training for engineers to become innovators in the rapidly expanding fields of RF, microwave, millimetre wave engineering. These technologies are at the heart of radio systems used for terrestrial, satellite and mobile communications and radar. This programme will help you to develop an ability to interpret user requirements and component specifications, to engineer effective designs within the constraints imposed by the available resources and the fundamental physical limits. This variant of the standard [RF and Microwave Engineering MSc \(/postgraduate/courses/taught/eece/rf-microwave-engineering.aspx\)](#) includes an industrial placement module.

**[Study here and find out why the University of Birmingham has been awarded The Times and The Sunday Times University of the Year 2013-14 \(http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx\)](#)**

### Course fact file

**Type of Course:** Continuing professional development, taught

**Study Options:** Full time, part time

**Duration:** 18 months full-time

**Start date:** September/October

### Related courses

[Postgraduate degree courses - Electronic, Electrical and Computer Engineering \(/schools/eece/postgraduate/index.aspx\)](#)

[RF and Microwave Engineering Masters/MSc \(/postgraduate/courses/taught/eece/rf-microwave-engineering.aspx\)](#)

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[School of Electronic, Electrical and Computer Engineering \(/schools/eece/index.aspx\)](#)

## Details

In an increasingly overcrowded electromagnetic spectrum, the efficient and reliable operation of wireless, mobile and satellite communication systems, and of radar and remote sensing systems, relies upon advanced components and subsystems that exploit ongoing developments in technologies such as microfabrication, nanotechnology and high frequency semiconductor devices.

This programme provides training for engineers to become innovators in these rapidly expanding markets. A firm grasp of the fundamentals is established through compulsory modules in the fundamentals of communications, in satellite, cellular and optical fibre communications, electromagnetics, antennas and propagation, radio frequency and microwave engineering and computer and communications networks provide advanced knowledge in an aspect of the relevant component technologies.

The programme will help you to develop an ability to interpret user requirements and component specifications, to engineer effective designs within the constraints imposed by the available resources and the fundamental physical limits. The programme provides a theoretical basis from which the design, construction and operation of satellite and cellular radio communications can be understood.

In addition to the modules taken as part of a standard MSc programme, the with Industrial Studies programme includes an industrial placement module. This provides an opportunity for you to develop ideas for your individual project on a topic related to the interests of the host company. The placement takes place during the summer, following the sessional examinations. After the industrial placement you return to the University to begin an individual project.

To qualify for this degree you must meet the standard requirements for an MSc, obtain and pass an industrial placement. To obtain a placement students must pass the January examinations at the first attempt and be selected by a company. Selection for a placement involves interviews with companies, which are arranged by the School from our extensive network of industrial contacts. The University will provide training in the preparation of a CV, and in interview technique but cannot guarantee a placement. Students who do not meet the requirements for a degree with industrial studies, including those who are unable to secure a placement, will revert to a standard degree programme.

### Related links

- [Postgraduate degree courses - Electronic, Electrical and Computer Engineering \(/schools/eece/postgraduate/index.aspx\)](#)
- [Postgraduate degree courses FAQ \(/schools/eece/postgraduate/faq.aspx\)](#)

## Modules

Compulsory modules	Semester
Introductory Module for Communications	1
Principles of Communication Systems	1

Electromagnetics, Antennas and Propagation	2
RF and Microwave Engineering	2
Individual Project	3
<b>Cross Programme Options (Take one of the following)</b>	<b>Semester</b>
Satellite, Cellular and Optical Fibre Communications	2
Computer and Communications Networks	2
RF Sensor Systems	2

## Fees and funding

### Tuition fees

Tuition fees for **2013/2014** are as follows:

- £6370 for **home/EU students**
- £20,820 for **international students**

### Further funding information

Learn more about **fees and funding** ([/postgraduate/pgt-fees/fees.aspx](http://www.birmingham.ac.uk/postgraduate/pgt-fees/fees.aspx))

### Scholarships and studentships

Scholarships may be available. International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

For further information contact the School directly or email [sfo@contacts.bham.ac.uk](mailto:sfo@contacts.bham.ac.uk) (<mailto:sfo@contacts.bham.ac.uk>)

## Entry requirements

At least an upper second-class Honours degree from a university of high international standing

Learn more about **entry requirements** (<http://www.birmingham.ac.uk/students/pg/requirements>)

### International students

We accept a range of qualifications from different countries – learn more about **international entry requirements** (<http://www.birmingham.ac.uk/students/pg/requirements/international>)

**English language requirements:** TOEFL (paper-based) 580, (computer-based) 230, (internet-based) 92, IELTS 6.5.

## How to apply

Learn more about **applying** ([/postgraduate/courses/apply-pg/index.aspx](http://www.birmingham.ac.uk/postgraduate/courses/apply-pg/index.aspx))

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the **How to apply pages** (<http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx>)

**Apply now** (<https://pga.bham.ac.uk/lpages/EPSo80.htm>)

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## Related links

**Postgraduate degree courses - Electronic, Electrical and Computer Engineering** ([/schools/eece/postgraduate/index.aspx](http://schools/eece/postgraduate/index.aspx))

**Postgraduate degree courses FAQ - Electronic, Electrical and Computer Engineering** ([/schools/eece/postgraduate/faq.aspx](http://schools/eece/postgraduate/faq.aspx))

**Electronic, Electrical and Computer Engineering MSc and MRes brochure (PDF 3.7MB)** ([/Documents/college-eps/eece/brochures/eece-msc-mres-brochure.pdf](http://Documents/college-eps/eece/brochures/eece-msc-mres-brochure.pdf))

## Learning and teaching

### Patterns of study

The majority of students study our taught Masters programmes full time. Our programmes are also suitable for practising engineers who wish to study part-time or take a single module to earn Continuing Professional Development (CPD) points. Many modules are completed in three-day sessions allowing you to focus one topic at a time. Following each session of lectures there is an opportunity for you to deepen your understanding through private study and in most cases there is also an assessed assignment.

### Overview module

There is a shared introduction to topics from communications engineering, requirements analysis and object-oriented design, and an introduction to and recap of C programming. For the communications engineering programmes there is an introduction to key issues in the design of antennas, radio frequency circuits and link budgets. For the computing programmes there is an introduction to object-oriented programming.

### Core modules

These modules cover the advanced specialist topics required for your specific degree programme, such as statistical signal processing and coding and advanced digital design. These technologies are at the heart of many current developments in modern electronic systems.

### Cross-programme option modules

These options specialize in topics relevant to each degree programme and give you the opportunity to adapt the programme that you have chosen to study. The prior knowledge needed for each module is specified in the student handbook to help you make the most appropriate choice. This allows you the greatest possible freedom to customise your study package appropriately.

### Individual project

This is an opportunity for you to develop specialist knowledge. Some projects are undertaken in collaboration with companies and, in some cases, you may work on company premises investigating issues of direct concern to future product development. Typical projects include the development of hardware for automotive radar signal processing and the detection of leaks in landfill sites, wireless access systems, 3G mobile radio for light aircraft, the creation of 3D worlds for surgery simulation and wearable computing.

### Assessment and awards

Assessment is by a combination of written examination and course work. There is a strong emphasis on course work to deepen understanding. The pass mark is 50%. A merit is awarded to students with an average of 60% or more and a distinction is awarded to students with an average of 70% or more, in both taught and project modules. There are prizes for students who perform especially well overall and for those who complete exceptionally good individual projects.

## Employability

### University Careers Network

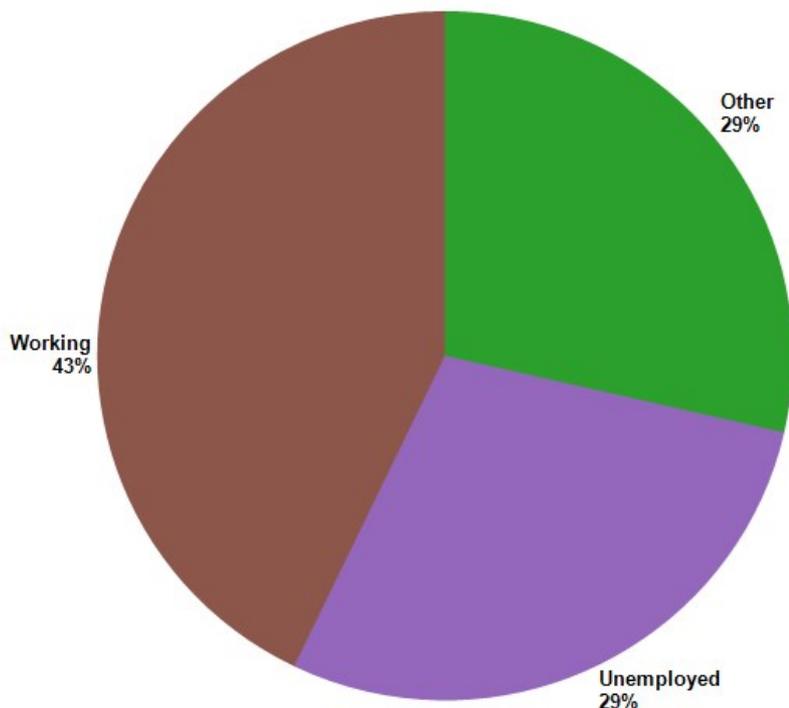
Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you achieve your goal.

Our unique careers guidance service is tailored to your academic subject area, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Our team source exclusive work experience opportunities to help you stand out amongst the competition, with mentoring, global internships and placements available to you. Once you have a career in your sights, one-to-one support with CVs and job applications will help give you the edge.

If you make the most of the **wide range of services** (<https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx>) you will be able to develop your career from the moment you arrive.

### Destinations of Leavers from Higher Education (DLHE) 2011/12 (postgraduate taught graduates)

The DLHE survey is conducted 6 months after graduation.



#### Examples of employers

- Aero Engine Controls
- Jaguar Land Rover
- Ministry of Defence
- Price Waterhouse Coopers
- Ernst and Young
- Arup
- Glaxo SmithKline
- NHS
- Talk Talk
- Autologic

#### Examples of occupations

- Electronic Engineer
- Applications Engineer
- Communications (Electronic) Engineer - Officer
- Optimisation Consultant
- Manufacturing Engineer
- Junior Business Analyst
- Test Engineer
- Service Specialist
- IT Analyst
- Development Engineer

#### Further study - examples of courses

- MSc Project Management

- MSc Radio Frequency and Microwave Engineering
- MSc Electronic and Computer Engineering
- MSc Physics and Technology
- Postgraduate Certificate in Education - teaching

- AAT accountancy

Visit the **Careers section of the University website** (<https://intranet.birmingham.ac.uk/as/employability/careers/college/eps.aspx>) for further information.