Programme Specification

A statement of the knowledge, understanding and skills that underpin a taught programme of study leading to an award from The University of Sheffield

Programme Details

1. Programme title	Wireless Communication Systems
2. Programme code	EEET30
3. QAA FHEQ level	7
4. Faculty	Engineering
5. Department	Electronic and Electrical Engineering
6. Other departments providing credit bearing modules for the programme	Not applicable
7. Accrediting Professional or Statutory Body	The Institution of Engineering Technology
8. Date of production/revision	December 2022

Awards	Type of award	Duration
9. Final award	MSc	1 year
10. Intermediate awards	PG Diploma	1 year
	PG Certificate	1 year

Programme Codes

11. JACS code(s) *Select between one and three codes from the HESA website.*	H641		
12. HECoS code(s) S*elect between one and three codes from the HECoS vocabulary.*	100159		

Programme Delivery

13. Mode of study	Full-time
14. Mode of delivery	In-person

15. Background to the programme and subject area

The last decade has seen unprecedented growth in digital wireless communication systems globally, in both the number of subscribers and the volume of data traffic transported by sophisticated wireless systems. Complementing this growth in demand, there has been a consistent advancement of the communication theories, enabling technologies and standards.

The high demand and rapid pace of development of spectrally efficient, and now energy efficient, wireless communication systems that are capable of supporting a diverse range of applications needing high bandwidths and differentiated quality of service has created a strong and vibrant global job market for wireless communications systems engineers. The Department of Electronic and Electrical Engineering at the University of Sheffield is one of a few UK academic institutions capable of meeting this demand through its existing teaching/research expertise and extensive facilities.

The objective of this MSc programme is to provide engineers with a thorough understanding of both the theory and the most up to date practices of the rapidly developing field of wireless communication systems. The programme encompasses all of the key design aspects of a modern wireless communication system, in particular cellular mobile systems. Starting from the fundamentals of digital communications theory, baseband digital signal processing, coding and modulation, antenna design, RF propagation and radio techniques for wireless systems, the programme then treats key systems integration aspects including wireless packet data networking and protocols, broadband wireless techniques, and cellular mobile principles and systems. This fulfils the industry's pressing need for communications engineers that have a comprehensive appreciation of wireless system design from RF through baseband to packet protocols.

It is accredited by the Institution of Engineering and Technology as a means of obtaining the further learning which, together with a BEng(Hons) degree of 2.2 or better, satisfies the educational requirements for Chartered Engineer status. The programme will be delivered with a bias towards research and development and we expect most graduates from this programme either to gain employment in the R & D industrial sector or to embark on further studies leading to a PhD, either at Sheffield or elsewhere.

Further information about the programmes may be found on the internet at
https://www.sheffield.ac.uk/eee/postgraduate/courses.

16. Programme aims

MSc Wireless Communications aims to:	
A1	provide access to a Masters level degree course in wireless communication systems to graduates or professionals from a variety of numerate and cognate backgrounds.
A2	provide students with "accredited" further learning which, together with an appropriate BEng(Hons) degree, will satisfy the educational base needed to become a Chartered Engineer.
A3	foster in students a commitment to self-improvement and continuing professional development.
A4	provide students with a detailed knowledge and understanding of the rapidly developing field of wireless communication.
A5	give students the opportunity to study particular aspects of wireless communication systems in depth, in particular cellular mobile systems, according to their interests.

A6	provide teaching that is underpinned by the research attainment and scholarship of the staff.
A7	prepare students for a professional career in wireless communication engineering including the provision of suitable generic skills.

17. Programme learning outcomes

Knowledge and understanding

On successful completion of the programme, students will be able to demonstrate knowledge and understanding of:

		Links to Aim(s)
K1	The fundamental principles of electronic and electrical engineering applied to wireless communication.	A1, A2, A4
K2	Advanced analytical methods relevant to wireless communication systems.	A4
K3	The design principles of modern wireless communication systems and new developments within the field.	A4, A5, A6
K4	The research methods and scientific techniques relevant to wireless communication systems.	A3
K5	The subject area of a student's individual research project.	A5

Skills and other attributes

On successful completion of the programme, students will be able to:

S1	gather, organise and critically evaluate information needed to formulate and solve problems.	A5
S2	apply acquired knowledge effectively and efficiently in any wireless communications application.	A4, A5
S3	produce verbal and written communications appropriate for the presentation of technical information.	A7
S4	work independently, and as a group, on technical problems.	A5, A7
S5	manage time effectively.	A7
S6	plan and execute a major research based investigation.	A7
S7	engage with personal and professional development.	A2

18. Learning and teaching methods

Development of the programme learning outcomes is promoted through the following teaching and learning methods:

· **Lectures –** used to transmit information, explain theories and concepts, and illustrate methods of analysis design.

· **Coursework assignments –** generally require students to seek additional information and work on their own, or sometimes in small groups, to develop understanding of subject matter.

· **Problem Sheets –** to assist students with their understanding and to resolve specific

problems.

- · **Formative quizzes –** to provide regular evaluation of basic competency in modules.

- · **Dissertation –** a major individual research study supervised by a member of academic staff and possibly a partner from industry, allows the student ample scope to display initiative, originality and creativity.

19. Assessment and feedback methods

Opportunities to demonstrate achievement of the programme learning outcomes are provided through the following assessment methods:

- · **Examinations** – usually of two/three hours duration consisting of competency based, threshold questions, and one/two more challenging questions to allow students to demonstrate depth of understanding.

- · **Coursework submissions** – these include design studies, computational assignments and research reports.

- · **Oral presentations**– students present their research work to their supervisors and peer group.

- · **Group design work**–students will work in teams to tackle engineering problems and present their findings.

- · **Individual project reports** - interim and detailed final reports are written describing the research work.

Opportunities for feedback are provided using the following methods:

- · **Formative quizzes** – Quizzes will be provided so allow students to check their basic competency.

- · **Project supervision** – During the individual research project students will be given verbal feedback during regular project meetings.

- · **Discussion with subject experts** – students are encouraged to ask questions of our subject experts during teaching sessions to gain feedback on problems faced and develop student learning

20. Programme structure and student development

Taught modules - Upon successful completion of the taught modules, students will have developed a thorough understanding of the fundamental principles underlying wireless communications. Most modules introduce advanced specialist knowledge designed to further enhance students' understanding and ability, and also to broaden their knowledge more generally. By the end of the second semester, students will be familiar with state-of-the-art within the wireless communications field. They will be able to assimilate and process advanced engineering concepts and present these orally and in writing to a variety of audiences.

Group design project - Students will work in small groups to tackle engineering problems set in a global context. The project aims to enhance design, project management, communication, and group working skills, which aim to help to develop student employability and professional development.

Research project - On successful completion of the research project, MSc students will, in addition, have developed their skills in research methods, time management and project management and will display initiative and imagination in their acquisition of frontier knowledge and in their approach to problem solving.

Detailed information about the structure of programmes, regulations concerning assessment and progression and descriptions of individual modules are published in the University Calendar available online at http://www.sheffield.ac.uk/calendar/.

21. Criteria for admission to the programme

Most students enter with UK degree level qualifications of at least lower second, although preferably upper second or first class standard or with equivalent qualifications from overseas. Those with industrial experience are considered on an individual basis. Applications are welcome from graduates of most of the disciplines that involve a high degree of mathematical competence. Typically students are expected to have degrees in an Electronic or related subject, or from backgrounds including Physics. Other branches of Engineering, Mathematics and Computer Science Students with these backgrounds will be considered carefully. In general those with a non-electronics background will be required to have a higher degree qualification in order to be admitted. General University requirements regarding English qualifications must also be satisfied.

Detailed information regarding admission to programmes is available from the University's On-Line Prospectus at http://www.shef.ac.uk/courses/. Specific details about the courses we offer in the departments can be found at https://www.sheffield.ac.uk/eee/postgraduate/courses.

22. Reference points

The learning outcomes have been developed to reflect the following points of reference:

Subject Benchmark Statements
https://www.qaa.ac.uk/quality-code/subject-benchmark-statements

Framework for Higher Education Qualifications (2014)
https://www.qaa.ac.uk/docs/qaa/quality-code/qualifications-frameworks.pdf

University Strategic Plan
http://www.sheffield.ac.uk/strategicplan

Learning and Teaching Strategy (2016-21)
https://www.sheffield.ac.uk/polopoly_fs/1.661828!/file/FinalStrategy.pdf

23. Additional information

The high admissions requirement reflects our desire to attract only the best students, who will benefit the most from our top rated research and our good quality teaching. From our existing MSc, a significant number of MSc graduates remain with us to subsequently study for PhDs.

The Communications research group has wide contact with the aerospace and mobile communications industries and is equipped with state of the art network analysis and antenna test facilities, the latter including anechoic chambers. These facilities can be used by project students undertaking projects in the communications area.

This specification represents a concise statement about the main features of the programme and should be considered alongside other sources of information provided by the teaching department(s) and the University. In addition to programme specific information, further information about studying at The University of Sheffield can be accessed via our Student Services web site at http://www.shef.ac.uk/ssid.