The University Of Sheffield.

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

1	**Programme Title**	Control & Systems Engineering
2	**Programme Code**	ACST55
3	**JACS Code**	HECoS: Control Systems, Systems Engineering & Information Technology. H660, H650, I200
4	**Level of Study**	Postgraduate
5a	**Final Qualification**	Master of Research (MRes)
5b	**QAA FHEQ Level**	Level 7
6a	**Intermediate Qualification(s)**	PG Cert
6b	**QAA FHEQ Level**	Level 7
7	**Teaching Institution** (if not Sheffield)	Not applicable
8	**Faculty**	Engineering
9	**Department**	Automatic Control & Systems Engineering
10	**Other Departments providing credit bearing modules for the programme**	None
11	**Mode(s) of Attendance**	Full-time
12	**Duration of the Programme**	12 months
13	**Accrediting Professional or Statutory Body**	Not applicable
14	**Date of production/revision**	March 2024

15. Background to the programme and subject area

The Department's MRes in Advanced Control and Systems Engineering programme covers the major aspects of Control and Systems Engineering. This is a fast changing discipline and an important aspect of the programme is to equip individuals with the research skills needed to pursue a research career, either in academia or industry. Control and Systems Engineering is a multidisciplinary subject and attracts graduates from many scientific disciplines. The programme provides broad analytical and practical skills and experience to apply Control and Systems concepts in many professional environments.

This programme is based on an existing programme which is continually evolving and has been running for over 30 years. The programme adds a strong research element, allowing students to focus. Students completing the programme will thus have further developed their control and systems engineering knowledge but also gain valuable knowledge and experience of in-depth research.

Content reflects the wide ranging breadth of expertise and research excellence of the Department. Teaching is informed by the research activity of staff which is of international quality (based on 2014 REF). In addition to foundation material the programme allows students to learn about some of the latest developments in the field from staff who publish their research findings world-wide.

The Department's Industrial Advisory Board (a mixture of industrial and academic members) has a primary role in advising the Department on its teaching provision, with particular emphasis on the suitability of its degree programmes as training and development for careers in engineering. In this way, the committee ensures the employability of the Department's graduates is enhanced.

16. Programme aims

This Programme offered by the Department of Automatic Control and Systems Engineering has the following broad aims consonant with the Mission Statement of the University of Sheffield.

These are to:

- educate to the highest possible standard, students from a wide variety of educational, social and cultural backgrounds.
- provide a supportive environment for continuing personal and professional development.
- enable students to pursue an MSc degree and engage in research-type modules, by providing research training in fundamental or applied research to the highest international standard.

Specific aims of the programme are to:

- provide access to a graduate Engineering degree course and Continuing Professional Development (CPD) for all individuals with a suitable level of academic ability and motivation towards research-level studies.
- deliver a degree programme with a level of choice, to support industry and fulfil a diversity of individual aspirations including aspiration towards a research career.
- ensure that teaching is underpinned and inspired by the research attainment and scholarship of staff.
- promote in individuals a desire for continuing self-improvement and development of interpersonal and transferable skills.
- provide appropriate teaching methods which follow sound pedagogy but which are suitable to meet the requirements of remote learners.
- provide appropriate assessment methods suitable for testing individuals' competencies and skills.
- support individuals within their professional career in the field of control and systems engineering and to provide opportunities for career advancement.
- deliver masters-level training to upgrade knowledge and skills appropriately beyond BEng degree level offering opportunities for individuals to seek Chartered Engineer status.
- enable graduates qualified in other engineering or scientific disciplines to convert to this discipline.
- develop conceptual skills for critical analysis of complex engineering problems.
- develop knowledge and understanding to analyse and manage a wide range of engineering tasks.
- develop and apply subject specific skills in control systems engineering analysis and design.
- provide research training via the extended research individual project.
- prepare students for a professional career (including research career) in the field of Control and Systems Engineering, including the provision of suitable interpersonal skills.
- support individuals within their professional career in the field of control and systems engineering and to provide opportunities for career advancement (including in academia/research).

17. Programme learning outcomes

Knowledge and understanding:	
K1	Fundamental principles of engineering science relevant to broad-based systems engineering.
K2	Sound understanding of how to use acquired knowledge effectively and efficiently in all aspects of work in the relevant areas of engineering.
K3	Sound knowledge and understanding of how to apply advanced techniques to problems at the frontiers of knowledge.
K4	Deep knowledge and advanced understanding of specialist areas within advanced control and systems engineering.
K5	Advanced understanding of the use of information technology for analysis, synthesis and design.
K6	Advanced understanding of the analytical and design methods used in systems engineering.
K7	Advanced understanding of the essential and advanced concepts of systems engineering specific to control systems.
K8	Deep knowledge and understanding to explain broad based techniques for examining control systems engineering issues.

Skills and other attributes:	
Intellectual Skills:	
I1	Gather, organise and critically evaluate information needed to formulate and solve problems, having a critical understanding of this process.
I2	Analyse and interpret experimental and other numerical data.
I3	Display creativity and innovation in solving unfamiliar problems.
I4	Exercise creativity, independent thought and judgement demonstrated in an item of individual research project work.
Practical kills:	
P1	Skills in oral and written communications appropriate for the presentation of technical information and interaction with specialists in other areas of engineering.
P2	Abilities in observation, measurement and the design and conduct of experiments through practical experience in the laboratory.
P3	Skills in writing computer programs to perform analysis of engineering problems.
P4	The ability to use commercial computer software for analysis, synthesis and design.
General Transferable kills:	
T1	Demonstrate skills in personal organisation, time management and self-motivation.
T2	Work collaboratively with others through the development of team skills.
T3	Use IT tools effectively, including industry standard software such as Simulink and Matlab.
T4	Communicate effectively both orally and in writing relating to both qualitative and quantitative information, designed to present essential scientific and technical concepts, of control and systems engineering.
T5	The ability to apply research methodology.

Students leaving with a PGDip / PGCert exit award will have covered all programme learning outcomes except K4, I3, I4, T5

18. Teaching, learning and assessment

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

The main teaching, learning and assessment methods adopted for each learning outcome are shown below. In most cases a combination of methods is used. In the early modules lectures are the principal means of imparting knowledge, and understanding is gained through a combination of tutorials, example classes, design classes and coursework assignments.

LEARNING OUTCOME	Lectures	Practical classes	Coursework assignments	Tutorials /examples classes	Individual investigative research project
K1	X	X	X	X	
K2	X	X	X	X	X
K3	X	X	X	X	X
K4		X	X		X

K5	X	X	X	X	
K6	X	X	X	X	X
K7	X	X	X	X	X
K8	X	X	X	X	X
I1	X		X	X	X
I2	X	X	X	X	X
I3					X
I4			X		X
P1		X	X		X
P2		X	X	X	
P3	X	X	X		
P4		X	X	X	X
T1			X		X
T2			X		
T3		X			X
T4			X		X
T5					X

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

Knowledge and understanding are primarily assessed in written examinations. However, in the later modules further knowledge and understanding is gained through project work and assessed in written reports and oral presentations. Skills are acquired mainly through coursework and the individual research project.

LEARNING OUTCOME	Written examinations	Coursework submissions	Class tests	Oral presentations / interviews	Individual project reports
K1	X	X			
K2	X	X	X	X	X
K3	X	X	X	X	X
K4	X	X		X	X
K5	X	X	X		
K6	X	X		X	X
K7				X	X
K8				X	X
I1	X	X			
I2		X			X
I3				X	X
I4		X		X	X
P1	X	X		X	X
P2		X	X		
P3		X	X		

P4		X	X		X
P5	X	X			
T1	X	X			X
T2		X			
T3		X	X		X
T4		X		X	X

19. Reference points

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

Mission Statement of the University of Sheffield, as presented in its Strategic Plan http://www.sheffield.ac.uk/strategicplan

The Education Strategy of the University of Sheffield.

The appropriate qualification descriptors contained in the QAA Framework for Higher Education Qualifications in England Wales and Northern Ireland – August 2015.

The QAA Subject Benchmark Statement – Engineering, March 2023.

The research interests of departmental staff and the research strategy of the Department of Automatic Control and Systems Engineering.

20. Programme structure and regulations

The programme structure is based on the structure of the existing MSc in Advanced Control & Systems Engineering, and taught modules will be taken alongside students on this programme. Students undertake the taught modules as outlined in the regulations.

Students undertake an individual research project. Depending on the interests of individual students, students can either work on a project about the study of system and control methodology or a project associated with the application of system and control approaches to solve the problems in a specific engineering discipline.

See regulations attached.

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

21. Student development over the course of study

During the taught element of the programme students will quickly consolidate their mathematical, scientific and computing knowledge along with the fundamentals of systems engineering. They will develop a more extensive knowledge and deeper understanding of systems engineering and related subjects during the first semester, and will be able to select and apply established methods of analysis to solve more difficult problems. They will undertake more detailed design work and students' practical and transferable skills will be further developed. During semester two students will be exposed to advanced methods of analysis for systems engineering problems and will have the opportunity to test their understanding of these methods by applying them to real-world examples. Their knowledge and understanding of professional issues and management will be enhanced.

During the academic year students will undertake an individual research project, which will allow students to demonstrate the full range of personal, communication and academic skills met within their programme of study. Assessment of the project is primarily based on the quality of the final project report produced by the student although other factors such as the oral presentation, personal qualities demonstrated, etc. are taken into account too. The research project module also includes a significant component on Research Skills delivered throughout the academic year.

Students' knowledge and understanding of professional issues and management will be enhanced via the 'research skills' seminars, which are an integral part of the project. The seminars cover research skills, as well as management and professional issues.

22. Criteria for admission to the programme

Engineering, mathematics or science honours graduate (holding a 1st class degree or equivalent) from a recognised institution

IELTS grade of 6.5 with a minimum of 6.0 in each component

Detailed information regarding admission to programmes is available from the University's On-Line Prospectus at https://www.sheffield.ac.uk/postgraduate/taught/courses/2024/control-and-systems-engineering-mres.

23. Additional information

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.