



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	Advanced Control and Systems Engineering
2	Programme Code	ELET001 / ACST01
3	HECoS Code	100162
4	Level of Study	Postgraduate
5a	Final Qualification	Master of Science (MSc)
5b	QAA FHEQ Level	7
6	Intermediate Qualification(s)	PG Diploma, PG Certificate
7	Teaching Institution (If not Sheffield)	Not applicable
8	Faculty	Engineering
9	School	School of Electrical and Electronic Engineering
10	Other School(s) involved in teaching the programme	Not applicable
11	Mode(s) of Attendance	Full-time
12	Duration of the Programme	1 year
13	Accrediting Professional or Statutory Body	Institute of Engineering and Technology (IET), Institute of Measurement and Control (InstMC)
14	Date of production/revision	March 2024

15. Background to the programme and subject area

The School's MSc 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 skills needed to keep up-to-date with developments after achieving an MSc. Control and Systems Engineering is a multidisciplinary subject and attracts graduates from many scientific disciplines.

The programme offers a solid grounding in systems and control engineering, combined with specialised content offering insights into the latest research in control theory and practice delivered by leaders in the field. The programme aims to cover diversity in student aspirations - providing graduates with the skills that enable them to succeed as professional systems and control engineers while also placing them in a good position to embark on a postgraduate research degree.

16. Programme aims

Programmes offered by the School are designed to fulfil the University's mission to provide high quality education for students from a wide variety of educational and social backgrounds. This is carried out in a research-underpinned environment, with staff working at the frontiers of academic enquiry.

The specific aims of the programme offered can be summarised as follows:

1. To provide access to a graduate engineering degree programme for all individuals with a suitable level of academic ability.
2. To provide students with teaching that is underpinned by the research attainment and scholarship of the staff.
3. To promote in individuals a desire for continuing self-improvement and development of interpersonal and transferable skills.
4. To enable graduates qualified in other engineering or scientific disciplines to convert to this discipline.

5. To develop the necessary knowledge and understanding to analyse and manage a wide range of engineering tasks.
6. To develop and apply subject specific skills in control systems engineering analysis and design.
7. To enable students to develop conceptual skills for critical analysis of complex systems engineering problems.
8. To provide students with subject specific skills in advanced control systems engineering analysis and design.
9. To deliver masters-level training to upgrade knowledge and skills appropriately beyond BEng degree level thus enhancing opportunities for individuals to seek Chartered Engineer status.
10. To fulfil student potential and develop personal transferable skills.

17. Programme learning outcomes

Knowledge and understanding:

On successful completion of the programme, MSc and Diploma students will have knowledge and understanding of:

K1	the fundamental principles of engineering science relevant to control systems engineering.
K2	the mathematics necessary to apply engineering science to control systems engineering.
K3	the analysis and design methods used in linear and non-linear control systems.
K4	the methods available to determine linear dynamic models of systems from experimental data.
K5	the use of information technology for analysis, synthesis and design.
K6	specialist topics for advanced control systems analysis and design.

In addition to K1-K6, MSc students will have knowledge and understanding of:

K7	research methods and techniques.
K8	a specific research topic by virtue of the individual project.

Skills and other attributes

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

S1	gather, organise and critically evaluate information needed to formulate and solve problems.
S2	analyse and interpret experimental and other numerical data.
S3	display creativity and innovation in solving unfamiliar problems.
S4	acquire skills in writing computer programs to perform analysis of engineering problems.
S5	demonstrate the ability to use commercial computer software for analysis, synthesis and design.
S6	acquire skills in written communication appropriate for the presentation of technical information.
S7	exercise independent thought and judgement.

In addition to S1-S7, MSc students will be able to:

S8	carry out a major item of individual project work.
S9	present and orally defend individual project work.

18. Teaching, learning and assessment

Development of the 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 and design. For many lecture programmes, tutorial/problem sheets are provided to enable students to develop their understanding of the lecture material during private study.

Practical Classes – students use PC-based software and laboratory hardware interfaced to PCs to gain

practical skills.

Coursework assignments – generally require students to seek additional information and work on their own in order to develop greater understanding of, and familiarity with, subject matter.

Tutorials and example classes – run for the whole class to help students with their understanding and to resolve problems as they work through tutorial/problem sheets.

Dissertation – a major research study carried out over the summer period. It is supervised by a member of the academic staff but permits the student ample scope to display initiative, originality and creativity.

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

Written examinations – mostly unseen examinations of 2 or 3 hours duration.

Coursework assignments – these include simulation studies, design exercises, computational assignments and practical experiment reporting.

Oral presentations – all students who submit a project dissertation must also make a short oral presentation of their work to an audience made up academic staff and fellow students.

Individual project dissertation – a major formal report describing the work undertaken during the Individual Project phase of the programme.

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 Autumn and Spring Semesters, lectures are the principal means of imparting knowledge, and understanding is gained through a combination of tutorials, practical classes and coursework assignments. Knowledge and understanding are primarily assessed by means of written examinations and programme work. Skills are acquired mainly through coursework and project work. MSc students develop research skills through work on an individual project conducted over the summer which then culminates in the writing of a dissertation.

LEARNING OUTCOME (abbreviated - see Section 17 for full text)	TEACHING / LEARNING					ASSESSMENT			
	Lectures	Practical classes	Coursework assignments	Tutorials /examples classes	Individual investigative project	Written examinations	Coursework submissions	Oral presentations / interviews	Individual project reports
K1 Fundamental principles	*		*	*		*	*		
K2 Mathematics	*		*	*		*	*		
K3 Analytical / design methods	*	*	*	*		*	*	*	
K4 Model identification	*	*		*		*			
K5 IT knowledge	*		*			*	*		
K6 Special Topics	*		*		*	*	*		*
K7 Research Techniques					*				*
K8 Research Topic					*				*
S1 Solve Problems	*	*	*	*	*	*	*		*
S2 Analyse Data		*			*		*		*
S3 Problem Solving		*	*		*		*		*

S4 Write Computer Programs		*	*		*			*		*
S5 Use Software		*	*		*			*		*
S6 Present Technical Information					*					*
S7 Independent Thought			*		*			*		*
S8 Individual Project					*					*
S9 Present Project					*				*	

The overall proportions of assessment by the methods listed are given in the following table.

	Proportion of Total Assessment (%)
Written examinations	49
Continuous Assessment	18
Oral presentations	3
Individual project report	30

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.

AHEP4, published in the Engineering Council reports: UK-SPEC (2020).

Feedback from Course Accreditation Panels representing the Institution of Engineering and Technology and the Institute of Measurement and Control.

The research interests of School staff and the research strategy of the School of Electrical and Electronic Engineering.

20. Programme structure and regulations

The programme structure is modular. Unlike most undergraduate modules which occupy a complete semester, the MSc modules are delivered in intensive format over a period of three weeks, having a credit tariff of 15 credits. Self-study weeks are included in the timetable to enable students to make progress with set coursework assignments or to consolidate learning in a more general sense. There are two exceptions to the above pattern of module delivery/credit allocation. First, at the beginning of the programme, all students take a “Foundation” module, worth 30 credits, which occupies the first six weeks. This module is designed to enable all students to gain an understanding of the principles of classical control analysis and design to be used as a basis for advanced modules studied later in the programme. It also provides exposure to key software tools such as Matlab early in the programme. The second exception is the individual project which has a credit tariff of 60 credits. This is a vital component of the programme and students are involved in their projects full-time from April until September.

There are two examination periods (January and April) and students who fail one or more modules may resit these but not during the timescale of the session for which they first registered. Resitting students must re-take failed modules during the following academic year with the repeat examinations scheduled at the same time as those for the next cohort.

Detailed information about the structure of programme, 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

All students take the same modules up to the first examination period in January. In the Foundation module, students will consolidate their mathematical, scientific and computing knowledge and be introduced to the fundamentals of systems engineering. They will be able to apply these to solve standard problems in systems engineering. They will also participate in design exercises requiring conceptual thinking, logical argument and judgement, and allowing the development of communication skills and teamwork. Following the Foundation module, students will be exposed to advanced methods of analysis for control systems engineering problems and will have the opportunity to test their understanding of these methods by applying them to real-world examples.

The individual advanced investigative project allows students to demonstrate the full range of personal, communication and academic skills met within the programme of study. Assessment of the project is primarily based on the quality of the final project dissertation produced by the student although other factors such as the oral presentation, personal qualities demonstrated, etc are taken into account too. Students will be expected to display levels of creativity, originality and judgement with those expected of masters degree graduates.

22. Criteria for admission to the programme

Detailed information regarding admission to the programme is available at <https://www.sheffield.ac.uk/eee/postgraduate/acse/courses>

23. Additional information

The pastoral care of students is very important. All new students are allocated a **Personal Tutor**, who can offer support on a range of matters including advising on module choices, career decisions and in providing references. The Personal Tutor also provides a mechanism for discussing sensitive matters that the student may wish to bring to the attention of the School in a confidential way.

For further information students are directed to the School web pages at <http://www.shef.ac.uk/acse>. These contain full information on courses and provide access to student handbooks.

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 School(s) and the University. In addition to programme specific information, further information about studying at The University of Sheffield can be accessed via the Student Services web site at <http://www.shef.ac.uk/ssid>.