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**	Mechanical Engineering with Industrial Management
2	**Programme Code**	MECT40
3	**JACS Code**	H300
4	**Level of Study**	Postgraduate (M level)
5	**Final Qualification**	MSc
6	**Intermediate Qualification(s)**	Postgraduate Diploma, Postgraduate Certificate
7	**Teaching Institution** (if not Sheffield)	Not applicable
8	**Faculty**	Engineering
9	**Home Department**	Mechanical Engineering
10	**Other Department(s) involved in teaching the programme**	Core modules: English Language Teaching Centre Optional modules: Materials Science and Engineering
11	**Mode(s) of Attendance**	Full-time
12	**Duration of the Programme**	1 year
13	**Accrediting Professional or Statutory Body**	Institution of Mechanical Engineers
14	**Date of production/revision**	February 2024

15. Background to the programme and subject area

Professional mechanical engineers are concerned with creating economic and social value through the design, development, production and maintenance of all kinds of artefacts that improve and support economies and societies. They are creative and logical people who synthesize information, solve problems and innovate. A career in mechanical engineering can involve graduates in any stage of the conception, design, production, finance and marketing of all manufactured goods. Research-trained mechanical engineers can go on to work in small to medium-sized companies, or a larger employer such as BAE Systems, Rolls Royce Plc, Jaguar or ICI. They can also work independently, begin their own business, work in a large number of disciplines where innovation and numeracy are required, or become established in research.

Many students who have completed undergraduate studies in mechanical engineering, or cognate disciplines, see their future career in management (often within the engineering industry), rather than in specialised technical engineering roles. To support them in achieving these career aspirations they need to gain knowledge of essential aspects of industrial management particularly as applied in an engineering environment. This combination of knowledge and skills, together with other general transferable skills, is highly regarded by industry and will enable graduates to develop solutions to challenges facing industry and society. The MSc and Diploma in Mechanical Engineering and Industrial Management provides an attractive blend of advanced mechanical engineering subjects, an understanding of contemporary challenges in the sector, industrial management approaches and professional skills. On successful completion students will have further developed their mechanical engineering knowledge but also gained knowledge of the essential aspects of industrial management. Students are taught in a research led-environment and the programme reflects the research strengths and industrial experience of staff.

This MSc in Mechanical Engineering and Industrial Management fully satisfies the academic requirements for further learning associated with the award of Chartered Engineer Status and is accredited by the Institution of Mechanical Engineers. Students successfully completing the programme will be well-suited to a career in industrial management.

Further information about the programme may be found on the internet at http://www.shef.ac.uk/mecheng

16. Programme aims

The University's Mission is to provide students from a wide variety of educational, social and cultural backgrounds with high-quality education in a research-led environment drawing on staff working at the frontiers of academic enquiry and with significant industrial experience. The Department of Mechanical Engineering implements this through its strong commitment to both teaching and research. It also aims to engender in its students a commitment to future self-learning and social responsibility.

The aims of the programme are to:

- encourage, expect and equip students in developing an advanced knowledge base grounded in a firm understanding of the context in which contemporary engineering takes place.
- support students as self-motivated, adaptable learners who can draw on engineering science, practical and 'how-to' skills to identify and solve the diversity of challenges present in modern engineering and technology on a global stage.
- provide teaching that is informed and invigorated by the research, scholarship and industrial experience of its staff and alert to the benefits of student-centred learning.
- develop in students an independence of thought, intellectual curiosity and critical approach to evidence, theories and concepts.
- provide students with a detailed and critical knowledge of selected advanced areas of mechanical engineering and industrial management, including knowledge of contemporary issues facing the industry.
- enable students to maximise their potential in all aspects of their course, understanding their strengths and weaknesses and beginning their journey of Continuous Professional Development.
- provide experience in a substantial research investigation appropriate to the programme.
- provide opportunities for students to become skilled in technical tools and practical techniques appropriate to their career direction and interests, and the professional skills needed for working effectively in a professional engineering environment.
- prepare students for postgraduate work and a career in Mechanical Engineering and/or Industrial Management.

17. Programme learning outcomes

Knowledge and understanding: By graduation MSc students will have:	
K1	advanced knowledge and understanding of the concepts, theories and principles in areas of industrial management and mechanical engineering appropriate to the programme.
K2	an understanding of how advanced analytical methods are used in mechanical engineering appropriate to the programme.
K3	critical knowledge of problems at the forefront of the specialism and an awareness of emerging technologies.
K4	a broad understanding of approaches to research in mechanical engineering.
K5	a broad understanding of the commercial and ethical context within which research is undertaken, including an awareness of the ethical implications of engineering.

Skills and other attributes: By graduation MSc students will be able to:	
S1	demonstrate skills in the acquisition, use and critical evaluation of subject-related information.
S2	conduct a research investigation, taking account technical, environmental, ethical, and commercial considerations.
S3	use engineering science, mathematics and information technology to analyse and solve engineering problems.
S4	display creativity and innovation in solving unfamiliar problems.
S5	deploy production tools to safely realise an idea into a product.
S6	communicate at a professional level, orally and in writing.
S7	work effectively in collaboration with others.

S8	exercise independent thought and judgement.
S9	describe their own strengths and weaknesses and use this to engage with their own development.
S10	use simple project and workload management tools to develop a systematic approach to structuring and tracking work and manage successful completion.

NB: Diploma students will have developed the learning outcomes associated with the acquisition of 120 credits selected in accordance with the programme regulations. Certificate students will have developed the learning outcomes associated with the acquisition of 60 credits selected in accordance with the programme regulations. An award of Diploma or Certificate shall therefore exclude the project.

18. Teaching, learning and assessment

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

The following are the main teaching and learning methods used:

Lectures - the principal means of transmitting academic material and analysis techniques. Most lecture courses are supported by tutorial sheets or case studies to enable students to develop their understanding of the subject matter and methods during their private study.

Tutorials and Example Classes - these may be small group or up to class sized tutorials and are a main source of providing help to students to resolve problems in their understanding of course material.

Laboratory Classes - these introduce experimental methods and provide a good opportunity for developing team-working and communication skills.

Coursework Assignments - a number of modules have coursework assignments that require students to seek additional information and work on their own, or sometimes in small groups. They are designed to enable you to develop and show your understanding of the content of the module.

Individual Project - This is a project on a research and/or industrial project at the frontiers of mechanical engineering and industrial management. It is done under the supervision of a member of the academic staff and provides an excellent opportunity for the student to pull together every aspect of their development during the programme. A significant component of the project is concerned with the industrial and commercial implications of the technical aspect of the project. The final written report, oral presentation and viva, which is given to a panel of academic staff is frequently at the highest professional standard.

The following are the main assessment methods used:

Written Examinations - these are typically 2-3 hours in duration. Some modules use this as the only or major assessment method.

Coursework Submissions - these can be essays or other work designed to assess the understanding of the module. Assignments are mainly undertaken on an individual basis but are sometimes carried out in small groups. Some assignments use oral and poster presentations in order to assess the development of presentation and communication skills. Some modules use this as the only or main method of assessment whilst others have this as a minor part with a written examination forming the major part of the overall assessment.

Oral Presentations - are used to develop these essential skills of the professional engineer. The aim is to increase proficiency during the programme so that the presentation of the individual project is at a professional level.

Individual Project Report - Assessed by the largest written report on the programme. This report details the final individual project. The project is also assessed by the presentation of pitch, and ultimately by an oral presentation and viva. The project is expected to be at a professional level.

Portfolio - professional skills and personal development are supported, developed, recorded and assessed through a portfolio which combines mandatory elements and personalised evidence.

The main teaching, learning and assessment methods adopted for each learning outcome are shown below. In most cases a combination of methods is used.

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LEARNING OUTCOME (abbreviated - see Section 17 for full text)	TEACHING / LEARNING				ASSESSMENT			
	Lectures	Coursework assignments, oral and poster presentations	Tutorials / examples classes	Individual research project	Portfolio	Written examinations	Coursework assignments, oral and poster presentations	Individual research project
K1 Advanced understanding	·		·	·		·		·
K2 Analytical methods	·		·			·		
K3 Critical knowledge		·		·			·	·
K4 Research approaches	·	·					·	·
K5 Context of research	·	·	·			·	·	
S1 Acquisition / evaluation of data			·	·			·	·
S2 Conduct research investigation				·				·
S3 Use engineering science	·	·	·			·	·	·
S4 Creativity, innovation and design				·				·
S5 Production skills								
S6 Communicate effectively		·		·			·	·
S7 Collaborate in teams		·					·	
S8 Independent thought		·		·			·	·
S9 Personal development			Y		Y			
S10 Project management		Ψ		Ψ			Ψ	Ψ

The overall proportions of assessment by the various methods are given in the following table:
(Note: A range is given due to some optional modules being assessed by different methods)

Written examinations	15-26%
Coursework submissions	33-44%
Individual project	33%
Portfolio	8%

19. 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 Vision and Strategic Plan
https://www.sheffield.ac.uk/vision

20. Programme structure and regulations

The programme structure is modular and runs full-time for 12 months; two academic semesters run from October to June with a summer period running from June to September. Students must obtain a total of 180 credits. In the first semester students undertake two 15 credit core industrial management units and a further 15 credit core industrial management unit in the second semester. Students can choose a further two optional technical modules over the two semesters.

The students take a 5 credit report writing module taught by the ELTC. This is classroom-based, and the students learn how to structure and write engineering reports effectively. The students must also take a 15 credit module comparing experimental and modelling techniques and their application to fluids, solid and dynamics, and a further 15 credit, professional development portfolio module where students tailor the module to their own skill development, this includes units for improving IT skills, career readiness and personal management skills as well as the professional responsibility of an engineer considering the ethical, social, legal and environmental issues that are essential for a professional engineer in the modern world.

MSc students undertake a group research project of 10 credits in the first semester and will start their background reading and planning for their individual research project with 5 credits over the second semester. The remaining 55 credits is undertaken in the summer. It is undertaken under the supervision of an academic member of staff and is related to established research work and/or industrial problems. It provides the student with an excellent opportunity to consolidate the skills and knowledge learnt on the programme during a major piece of individual work.

Students who do not achieve the requirements for the Master programme will be awarded a Postgraduate Diploma provided they achieve at least 120 credits from units which shall exclude the project.

Students who do not achieve the requirements for the Postgraduate Diploma will be awarded a Postgraduate Certificate provided they achieve at least 60 credits from units which shall exclude the project.

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 https://www.sheffield.ac.uk/calendar/

21. Progression through the programme structure

Autumn semester	Students will study advanced mechanical engineering subjects and will be able to tackle successfully advanced problems related to this area. They will be also introduced to the engineering innovation process by undertaking an industrial management related module and commence the comparison of modelling and experimental techniques.
Spring semester	Students will be provided with more extensive knowledge and deeper understanding of advanced mechanical engineering subjects. They will be able to select and apply established methods of analysis to solve various problems. They will undertake more industrial management units, which will further develop their knowledge in this area as well as their capabilities to work as a group. Students will look at the professional responsibility of an engineer and consider ethical, social, legal and environmental issues that are essential for a professional engineer in the modern world. Students' practical and transferable skills will be further developed. Students will plan their final project, they will carry out their literature review at this stage and give a project pitch.
Summer period	Students will undertake their individual project in this period. They will produce a project plan and an outline for their project and will present this in a colloquium. Written reports outlining progress and problems, and plans will be required on a fortnightly basis and will form a record of the project. Students will further develop their project and will conclude it with a 10,000 word dissertation and a 30 minute oral examination. Students will also undertake an organic knowledge management module which focuses on the commercial side of the project, concentrating on such areas as proximity to market, competitive technologies and potential spin-off applications.

On successful completion of the programme

Students will have obtained the necessary academic qualification and practical engineering skills for becoming a Chartered Mechanical Engineer. Full Chartered Engineer status may require some further acquisition of knowledge and skills and will require appropriate experience following completion of the programme. Students will also be well prepared for junior/middle management positions in mechanical engineering and industrial management and for also a wide range of other careers. They will also be able to assess whether or not they have the ability, motivation and interest to pursue a PhD in mechanical engineering and industrial management.

22. Criteria for admission to the programme

A good honours degree in Mechanical Engineering or a related subject, or equivalent qualifications is required.

The department of Mechanical Engineering aims to train high quality engineering students to produce excellent professionals and future business leaders. We believe that by implementing an entrance examination, we will not only achieve this, but also will ensure students a successful performance throughout their degree.

Therefore, prospective students are required to undertake the GMAT test. The Department of Mechanical Engineering accepts 600 points as a satisfactory mark.

The GMAT (Graduate Management Admissions Test) test can be undertaken in any of the GMAT centres around the world. In order to locate the centre that suits you the best go to http://www.gmat.com

The University of Sheffield GMAT code is: 0846. Please provide this code when undertaking the examination, this way you authorise the GMAT organisation to send us your results.

Detailed information regarding admission to the programme is available at http://www.shef.ac.uk/study/

23. Additional information

Every student has a Personal Project Supervisor who is a member of the academic staff of the department. Students first meet their Supervisor in the first week of the programme. After that they see them either fortnightly or monthly according to the student' progress and needs. They will discuss the student's project but the supervisor can be a great help for example in advising on module choices and providing references.

Academic staff in the Department of Mechanical Engineering are organised into research themes that reflect their specific areas of research activity. Each theme incorporates a number of clusters that contain staff whose interests encompass both fundamentals and applications. At the applied level, groups co-operate with industry. Expertise in the different groups covers the need for the different programmes. Current research activities can be summarised in five main themes:

- Biomechanics
- Dynamics
- Manufacturing & Design
- Solid Mechanics
- Thermofluids

Further details about the department, courses offered and admission procedures can be found at the departmental Web site http://www.shef.ac.uk/mecheng

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 www.shef.ac.uk/ssid.