PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	MSc
4	**Programme Title**	Master of Science in Microsystems Engineering
5	**Programme Code**	5150F
6	**Programme Accreditation**	IMechE, IET (2011)
7	**QAA Subject Benchmark(s)**	Engineering: Annex B4, MEng degrees, Jan 2010 (www.qaa.ac.uk) Applicability of Output Standards to Masters degrees other than the integrated MEng, Nov 2011 (www.engc.org.uk/UKSPEC/)
8	**FHEQ Level**	7
9	**Last updated**	February 2012

10 Programme Aims

This degree programme (for suitably qualified graduates from engineering and science first degree backgrounds cognate to mechanical engineering) aims to:

1. Develop their knowledge, understanding and skills, as well as awareness and "know how", in the field of Microsystems based on mechanical engineering and related disciplines (microelectronic systems, bioscience, nanoscience and nanomaterials) so that as Masters graduates they will be equipped to enter employment as professional engineers (progressing on to Chartered Engineer or equivalent status) or in other professional careers, providing the engineering industry and professions (in the UK and elsewhere) with employable and enterprising graduates who have an appreciation of the value of education to the wider community.

2. Prepare for engagement in life-long learning (eg professional CPD or further Higher Education) with capability in critical enquiry, research and knowledge acquisition through studying in depth a range of aspects of modern Microsystems Engineering , with exposure to specialist modules on, eg, microsystems and bio-MEMS (Micro Electro-Mechanical Systems),mechatronics, nanomaterials and nanoscale science, microprocessor systems, semiconductor fabrication, new product introduction.

3. Gain an internationally recognised qualification which meets the requirements of the Framework for Higher Education Qualifications at Masters Level 7 with particular reference to the QAA Subject Benchmark Statement for Engineering (Annex MEng degrees) and to the Engineering Council UK statement on Applicability of Output standards to Masters degrees.

4. For non-native speakers of English, extend their English language skills appropriate to the application of Microsystems Engineering in engineering and industry through experience of life and study in a UK Higher Education institution.

5. Achieve the above in the contexts of the School, SAgE Faculty and University business plans, following the University's policies and procedures and conforming to the relevant sections of the QAA Code of Practice.

11 Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas. The programme outcomes have references to the benchmark statements for (subject) (X).

Knowledge and Understanding

On completing the programme students should have:

A1 An advanced level of knowledge and understanding of the relevant underlying mechanical engineering principles, practices, materials, components and systems for this field of advanced study. (UKSpec mUS1, mP2 & A1)

A2 A good awareness (sufficient for critical evaluation and effective application) of relevant terminology, concepts and practices in this field of specialisation, including those from other engineering disciplines and from outside engineering. (UKSpec mUS3 & mP1)

A3 Knowledge of current and developing practices in the field of specialisation, with critical awareness of the constraints on and limitations of these, leading to the potential for continuous improvement and the emergence of new approaches. (UKSpec mUS2 & A2, QAA Q1)

Intellectual Skills

On completing the programme students should be able to:

B1 Critically evaluate the state-of-the-art in the specialist field and apply their specialist knowledge to identify potential opportunities for improvement or innovation in the field. (UKSpec mE1, A2 & B1, QAA Q4)

B2 Exploit acquired relevant knowledge innovatively in the application of appropriate methods or solutions for processes, products or systems in the specialist field. (UKSpec mD1, QAA Q3)

B3 Apply relevant research and information retrieval, data collection and analysis and systematic engineering methods and models appropriately to new or uncertain or complex problems in the field of specialisation. (UKSpec mE2, mE3 & B2, QAA Q2 & Q5)

B4 Apply relevant knowledge to support informed decisions with complex or uncertain problems or risks in the field of specialisation. (UKSpec mS2, QAA Q5 & Q9)

Practical Skills

On completing the programme students should be able to:

C1 Assess effectiveness of planning and evaluate implementation progress towards solutions and designs . (UKSpec B3 & C1)

C2 Operate within the professional context of safe systems of work and compliance with relevant codes of practice and conduct in ways that promote sustainability. (UKSpec E1, E2 & E3)

Transferable/Key Skills

On completing the programme students should have demonstrated:

D1 Independent learning ability, self-direction and autonomy leading to the ability to continue to develop their knowledge understanding and skills through further professional development. (UKSpec E4, QAA Q6, Q7 & Q10)

D2 Ability to communicate effectively in English presenting and discussing their work with others in the field of specialisation. (UKSpec D1, D2 & D3)

Teaching and Learning Methods

Key elements of professional Masters graduate employability are that employers need to be sure that graduates are able to take individual responsibility for their own and others' work without supervision, that they are capable of assimilating and organising complete information quickly and effectively and that they are self-learners, capable of keeping abreast of new developments without organisational support. Our approach to teaching and learning is designed to produce Masters graduates who meet these criteria. From the outset, students will be expected to meet the basic professional requirement of taking responsibility for their own learning.

With engineering degrees lectures are extensively used to provide structure for each subject, to help to direct students' further reading and self study, to convey how the underlying engineering science is applied to discipline specific problems and to demonstrate approaches to problem-solving. Typically student self-study after lectures is supported by tutorial or problem classes, where advice is given on request to students who have issues arising from their application or understanding of the lecture material. Other types of classes include longer "hands-on" practical laboratory/workshop/computer sessions, seminar/presentation activities and design project work where teamwork often features.

There is an expectation that students will manage their own learning, with seminar classes in which students present material they have researched themselves and independent work on assignments prevalent. This includes a team design project carried out with regional industry. Students undertake a major 60 credit individual project related to the specialist stream they are following. The Accrediting Institutions place a high importance on this project which must be passed to get the Degree.

Assessment Strategy

Professional practice in industry demands the ability to bring methods and data together, apply problem-solving skills and demonstrate understanding under time constraints. To reflect this, the major unseen written examination remains a valid assessment tool and forms an important element in our assessment strategy. However, there are equally many disciplines and skills where it is restrictive or inappropriate and engineering degrees are noted for the breadth of assessment tools that are used to obtain a balanced measure of the student. Spot or phase tests (including MCQ) and short assignments help students structure their study and revision towards the synoptic end-of-module examinations. Laboratory/workshop, design and computing work are all best assessed through realistic assignments, with many of these being team assignments and involving oral or poster, as well as written reporting. Application of major engineering software features in most main technical subject areas.

Assessment of major project work particularly innovative. The traditional "mini PhD " thesis or dissertation with vivas has been replaced by a much broader and more challenging assessment more in line with the needs of industry and professional engineering, incorporating the maintaining of a contemporaneous logbook, a short report typical of business reports or technical journal papers, an oral presentation or practical demonstration and a poster.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

This is a full-time, one year (three semesters) programme, starting in September, leading to the award of the degree of Master of Science (MSc).

The taught component of the programme consists of a total of 120 credits (1 credit ≡10 study hours, including timetabled contact hours and private study) studied during Semesters 1 and 2 (September to June). Students begin preliminary work (eg literature review etc) on their 60 credit major project in Semester 1, with work continuing throughout the year with an intermediate assessment point at the end of Semester 2 and being completed in Semester 3 (June – September). Project work must be submitted for assessment in August.

Key features of the programme (including what makes the programme distinctive)

The desirability of multi-disciplinary learning is a national priority noted by EPSRC. The key feature of this programme is its inter-disciplinary nature, achieved by modules being taught using expertise across two Faculties (SAgE & Medicine) with three different SAgE engineering Schools involved. Though Microsystems can have a very broad range of applications, the focus of this programme is on biomedical and health care applications to ensure that graduates have experience of a key non-engineering market. With this breadth of inter-disciplinary content, the programme taught content is fully defined to ensure that the required background for the major project is all covered, this ranging from nano materials and science, though microelectronics and mechatronics and with biomedical engineering to new product introduction.

Programme regulations (link to on-line version)

http://www.ncl.ac.uk/regulations/programme/

13 Criteria for admission

Entry qualifications
Applicants for this MSc should have a good (normally Upper Second Class or equivalent). Honours level first degree or equivalent in a relevant engineering discipline. Applicants who hold non-standard qualifications and/or have relevant professional experience requiring the regular exercise of Bachelor Level 6 engineering knowledge, skills and understanding, may be considered on an individual basis and may be required to attend for interview if practical. Non-standard applications are directed via the University Enquiries to Registration portal to the Degree Programme Director to evaluate (evidence of extensive and recent work based experience is essential).

Admissions policy/selection tools
All applicants should apply through the University Enquiries to Registration portal.
http://www.ncl.ac.uk/postgraduate/apply/form/

Level of English Language capability
Applicants who are non-native speakers of English will usually be required to provide evidence of English language proficiency equivalent to IELTS 6.0 or better.

14 Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: *http://www.ncl.ac.uk/students/*

Induction
During the first week of the first semester students attend an induction programme. New students will be given a general introduction to University life and the University's principle support services and general information about the School and their programme, as described in the Degree Programme Handbook. New and continuing students will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. The International Office offers an additional induction programme for overseas students.

Study skills support
Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. Some of this material, e.g. time management is covered in the appropriate Induction Programme. Students are explicitly tutored on their approach to both group and individual projects. Numeracy support is available through Maths Aid and help with academic writing is available from the Writing Development Centre (further information is available from the Robinson Library). All non-native speakers of English will take the University Language Assessment at Induction and may be directed to follow the non-credit bearing In-Sessional English Language support classes.

Academic support
The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Staff-Student Committee, and/or at the Board of Studies.

Pastoral support
All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. In addition the University offers a range of support services, including one-to-one counselling and guidance or group sessions / workshops on a range of topics, such as emotional issues e.g. Stress and anxiety, student finance and budgeting, disability matters etc. There is specialist support available for students with dyslexia and mental health issues. Furthermore, the Student Union operates a Student Advice Centre, which can provide advocacy and support to students on a range of topics including housing, debt, legal issues etc.

Support for students with disabilities
The University's Disability Support Service provides help and advice for disabled students at the University - and those thinking of coming to Newcastle. It provides individuals with: advice about the University's facilities, services and the accessibility of campus; details about the technical support available; guidance in study skills and advice on financial support arrangements; a resources room with equipment and software to assist students in their studies.

Learning resources
The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

15 Methods for evaluating and improving the quality and standards of teaching and learning

Module reviews
All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the Board of Studies and/or the School Teaching and Learning Committee. Student opinion is sought at the Staff-Student Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Teaching, Learning and Student Experience Committee.

Programme reviews
The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Teaching, Learning and Student Experience Committee. The FTLSEC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Teaching, Learning and Student Experience Committee.

External Examiner reports
External Examiner reports are considered by the Board of Studies. The Board responds to these reports through Faculty Teaching, Learning and Student Experience Committee. External Examiner reports are shared with institutional student representatives, through the Staff-Student Committee.

Student evaluations
All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Staff-Student Committee, and the Board of Studies. The results from student surveys are considered as part of the Annual Monitoring and Review of the programme and any arising actions are captured at programme and School / institutional level and reported to the appropriate body.

Mechanisms for gaining student feedback
Feedback is channelled via the Staff-Student Committee and the Board of Studies.

Faculty and University Review Mechanisms
The programme is subject to the University's Internal Subject Review process. Every six years degree programmes in each subject area are subject to periodic review. This involves both the detailed consideration of a range of documentation, and a one-day review visit by a review team which includes an external subject specialist in addition to University and Faculty representatives. Following the review a report is produced, which forms the basis for a decision by University Teaching, Learning and Student Experience Committee on whether the programmes reviewed should be re-approved for a further six year period.

Accreditation reports
Accreditation was given by IMechE and IET (formerly the Institution of Electrical Engineers) in 2011. Accreditation is for 5 years and the next re-accreditation visit is due in 2016.

16 Regulation of assessment

Pass mark
The pass mark is 50%

Course requirements
Progression is subject to the University's Masters Degree Progress Regulations, Taught and Research and Examination Conventions for Taught Masters Degrees. Limited compensation up to 20 credits of the taught element and down to a mark of 40% is possible and there are reassessment opportunities, with certain restrictions.

The University employs a common marking scheme, which is specified in the Taught Postgraduate Examination Conventions, namely:

Summary description applicable to postgraduate Masters programmes		**Summary description applicable to postgraduate Certificate and Diploma programmes**	
<50	Fail	<50	Fail
50-59	Pass	50 or above	Pass
60-69	Pass with Merit		
70 or above	Pass with Distinction		

Role of the External Examiner
An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching and Learning Committee, following recommendation from the Board of Studies. The External Examiner is expected to:

i. See and approve assessment papers
ii. Moderate examination and coursework marking
iii. Attend the Board of Examiners
iv. Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:

The University Prospectus: http://www.ncl.ac.uk/postgraduate/

The School Brochure http://www.ncl.ac.uk/marketing/services/print/publications/ordering/

Degree Programme and University Regulations: http://www.ncl.ac.uk/regulations/docs/

The Degree Programme Handbook

Please note. This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.

Annex

Mapping of Intended Learning Outcomes onto Curriculum/Modules

Either

Intended Learning Outcome	Module codes (Compulsory in Bold)
A1	**MEC8025**
A2	**CME8034, CME8101, EEE8019, EE8022, MEC8023, MEC8027, MEC8095**
A3	**CME8034, CME8101, ENG8017, MEC8023, MEC8025 MEC8027, MEC8095**
B1	**MEC8023, MEC8025, MEC8095**
B2	**CME8034, CME8101, EEE8019, EE8022, ENG8017, MEC8027**
B3	**MEC8023, MEC8027, MEC8095**
B4	**ENG8017, MEC8095**
C1	**ENG8017, MEC8025, MEC8027, MEC8095**
C2	**ENG8017, MEC8095**
D1	**CME8034, CME8101, EEE8019, EEE8022, ENG8017, MEC8023, MEC8025 MEC8027, MEC8095**
D2	**ENG8017, MEC8095**

Or

		Intended Learning Outcomes			
Module	**Type**	**A**	**B**	**C**	**D**
CME8034	Compulsory	2, 3,	2		1
CME8101	Compulsory	2, 3	2		1
EEE8019	Compulsory	2	2		1
EEE8022	Compulsory	2	2		1
ENG8017	Compulsory	3	2, 4	1, 2	1, 2
MEC8023	Compulsory	2, 3	1, 3		1
MEC8025	Compulsory	1, 3	1	1	1
MEC8027	Compulsory	2, 3	2, 3	1	1
MEC8095	Core	2, 3	1, 3, 4	1, 2	1, 2