PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University (Singapore Campus)
3	**Final Award**	BEng (Hons)
4	**Programme Title**	1210U Bachelor of Engineering with Honours in Mechanical Design and Manufacturing Engineering (Singapore version)
5	**UCAS/Programme Code**	Not applicable (equivalent to HH73)
6	**Programme Accreditation**	
7	**QAA Subject Benchmark(s)**	http://www.qaa.ac.uk/academicinfrastructure/benchmark/Honours/Engineering10.pdf
8	**FHEQ Level**	6
9	**Date written**	October 2010, updated February 2012

10 Programme Aims

This degree programme is intended for students having appropriate relevant Accredited Prior Learning (IEng- and EngTech-type at FHEQ Level 4 or higher, as exemplified by Singaporean Polytechnic Diplomas in engineering and manufacturing) to make a two-year transition to a UK Bachelors Honours degree (CEng-type FHEQ Level 6) which:

- Provides manufacturing industry and the engineering profession in Singapore and elsewhere with employable and enterprising graduates prepared for the assumption of technical, managerial and financial responsibilities and progression to chartered professional engineer status, building on their awareness of current technologies and industrial practice to develop a "mindset" for original thinking and autonomous development of innovative products and manufacturing systems.
- Develops students' existing qualifications and "know how" base to develop an understanding of:
  - The synergy between manufacturing and mechanical, materials and mechatronics engineering, with the need for systems thinking in the design of innovative products in an inter-disciplinary context.
  - The importance in engineering design of the behaviour of materials and of sustainability during all the phases of manufacture, service life, subsequent decommissioning and recycling of products.
  - The value of analytical skills, critical thinking and the ability to work from first principles with an awareness of implicit assumptions and limitations.
- Prepares students to engage in life-long learning (eg professional CPD or continuing Higher Education at Masters-level) and critical enquiry with skills in research and knowledge acquisition and an appreciation of the value of education to the wider community.
- Provides students with a UK qualification that is internationally recognised and which meets the requirements of the Framework for Higher Education Qualifications and of the Engineering Council (UK) UKSpec for CEng Accredited Bachelors Degrees, while 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 Engineering and to UK Spec Specific Learning Outcomes.

Knowledge and Understanding

On completing the programme students should have:

A1 Knowledge and understanding of scientific principles and methodology necessary to underpin their education in mechanical and related engineering disciplines, to enable appreciation of its scientific and engineering context and to support their understanding of future developments and technologies in mechanical engineering and manufacturing (UK Spec US1).
A2 Knowledge and understanding of mathematical principles necessary to underpin their education in mechanical and related engineering disciplines (UK Spec US2).
A3 The ability to understand and apply engineering principles to analyse key processes in manufacturing and mechanical and related engineering (UK Spec P1).
A4 Knowledge and understanding of commercial and economic context of mechanical engineering processes (UK Spec S1).
A5 Knowledge of management techniques which may be used to achieve engineering and manufacturing objectives within the context of mechanical engineering processes (UK Spec S2).
A6 Understanding of the requirement for mechanical engineering activities to promote sustainable development (UK Spec S3).
A7 Knowledge of characteristics of particular mechanical and related engineering equipment, processes or products (UK Spec P1).

Intellectual Skills

On completing the programme students should be able to:

B1 Apply scientific principles and methodology to mechanical and related engineering disciplines and to appreciate the scientific and engineering context of future developments and technologies (UK Spec US1).
B2 Apply mathematical methods, tools and notations proficiently in the analysis and solution of mechanical engineering problems (UK Spec US2).
B3 Apply and integrate knowledge and understanding of other engineering disciplines to support the study of Mechanical Design and Manufacturing Engineering (UK Spec US3).
B4 Identify, classify and describe the performance of systems and mechanical components through the use of analytical methods and modelling techniques (UK Spec E2).
B5 Apply a systems approach to Mechanical Design and Manufacturing Engineering problems (UK Spec E4).
B6 Investigate and define a problem and identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues (UK Spec D1).
B7 Understand customer and user needs and the importance of considerations such as aesthetics (UK Spec D2).
B8 Ensure fitness for purpose for all aspects of mechanical engineering problems including production, operation, maintenance and disposal (UK Spec D5).
B9 Manage the engineering design process and evaluate outcomes (UK Spec D6).
B10 Apply management and business practices appropriately to strategic and tactical issues in mechanical engineering and manufacturing (UK Spec S2).
B11 Recognise contexts in which mechanical engineering knowledge can be applied (ie operations and management, technology, product development) (UK Spec P3).

Practical Skills

On completing the programme students should be able to:

C1 Apply quantitative methods and computer software relevant to mechanical and related

engineering disciplines to solve engineering problems (UK Spec E3).

C2 Identify and manage cost drivers in mechanical engineering and manufacturing (UK Spec D3).

C3 Work within the framework of relevant legal requirements governing engineering activities, including personnel, health and safety, and risk (including environmental risk) issues (UK Spec S4).

C4 Recognise the nature of intellectual property and contractual issues (UK Spec EP5).

C5 Work within appropriate codes of practice and industry standards (UK Spec EP6).

C6 Recognise quality issues (UK Spec P7).

C7 Work with technical uncertainty (UK Spec P8).

Transferable/Key Skills

With the exception of foreign language skills, this programme aims to cover all elements of the Newcastle University Graduate Skills Framework. In addition, on completing the programme students should also be able to:

D1 Understand customer and user needs and the importance of considerations such as aesthetics in mechanical and manufacturing engineering (UK Spec D2).

D2 Use creativity to establish innovation in manufacturing and mechanical and related engineering disciplines (UK Spec D4).

D3 Understand the need for a high level of professional and ethical conduct in engineering (UK Spec S5).

D4 Demonstrate awareness of mechanical engineering workshop and laboratory skills (UK Spec P2).

D5 Use technical literature and other information sources (UK Spec P4).

Teaching and Learning Methods

Key elements of professional graduate employability are that employers need to be sure that graduates are able to take individual responsibility for their own 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 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.

Within 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. However, to develop the students as self-learners, other types of classes include longer "hands-on" practical laboratory/workshop sessions, seminar/presentation activities, design project work and CAD/computer sessions where teamwork often features.

There will be an average of around 25 contact hours per week, about half of which will be lectures, about a third tutorials, seminars or workshops supporting those lectures and the remainder practical and computing activities.

At Stage 3 there is a greater 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 more prevalent. At Stage 3 students undertake a major 30 credit individual project in Mechanical Design and Manufacturing Engineering. The project is "core", ie it must be passed to get an Honours 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 end-of-course 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. Short assignments help students structure their study and revision towards the synoptic end-of-course 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.

At Stage 2 the balance of assessment between end-of-course examination and various forms of in-course assessment is approximately 40:60 (excluding the Design module). At Stage 3 (excluding the major individual project) the proportions for the taught modules are about 50:50. Assessment of major project work at Stage 3 is particularly challenging and, in line with the needs of industry and professional engineering, incorporates the maintaining of a contemporaneous logbook, a short report typical of technical journal papers, an oral presentation and a poster presentation.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

The normal undergraduate year is approximately 30 weeks (including examination periods), divided into two semesters. This programme is open only to students with Accredited Prior Learning which confers advanced standing and exempts them from Stage 1 of the degree so this normally lasts two years (Stages 2 and 3). A Newcastle University credit is the equivalent of 10 notional hours of student study. Each module is a self-contained part of the programme of study and carries a credit weighting. Every Honours student studies 120 credits in each year. Students graduating from this programme with a BEng will have completed 240 credits.

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

This programme is specifically designed for those candidates who have successfully completed a Diploma in a relevant subject at any polytechnic in Singapore, or any other qualification equivalent to Stage 1 of a BEng Degree Programme in the School of Mechanical and Systems Engineering at Newcastle University.

This programme is delivered by Newcastle University in collaboration with the Singapore Institute of Technology. The quality and standards of delivery in Singapore will be the same as the delivery of similar programmes in the School of Mechanical and Systems Engineering at Newcastle University. Successful candidates will be awarded a BEng degree from Newcastle University.

Candidates who achieve a satisfactory average (as defined in the degree programme regulations and handbook) shall be eligible to continue their studies at MEng level at Newcastle University. Entry to MSc programmes at Newcastle University is possible following successful completion of this programme at levels specified for individual MSc programmes.

After successful completion of Year 1 in Singapore, students should attend an immersion programme delivered at Newcastle University campus during the UK summer vacation over a short period of 3 to 5 weeks. The Newcastle campus summer immersion programme will be an in-depth induction to the academic skills and “mindset” demanded for high-level performance at Honours degree level (and in particular the Stage 3 major individual project) focussed around the Newcastle University Graduate Skills Framework. It will include both individual and team activities with formative assessment involving various forms of written, oral and graphical presentation.

Programme regulations (link to on-line version)

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

13 Criteria for admission

Entry qualifications
Engineering requires a wide range of attributes and abilities, so selection may not be solely based on academic grades.

Academic admission normally conforms to the minimum requirements for entry to Stage 2 of the equivalent Newcastle University Bachelor of Engineering programme in any of the UG Degree programmes in the School of Mechanical and Systems Engineering. A Diploma in a relevant subject area awarded by any polytechnic in Singapore is an accepted entry qualification, and other equivalent international qualifications, comprising appropriate subjects and grades, may also be considered.

Admissions policy/selection tools

Undergraduate selectors at Newcastle University will consider applications from Singaporean polytechnic graduates or other candidates who may qualify to enter this degree programme. Academic selectors seek evidence of motivation and commitment from the Personal Statement and Reference on application forms and applicants are encouraged to attend for interview whenever possible.

Level of English Language capability
Applicants from polytechnics in Singapore who have successfully completed their diploma and previous education in English would qualify to apply for this degree programme and are exempt from an English language proficiency test. Other applicants, whose first language is not English, would be required to demonstrate achievement of IELTS 6.0 or an equivalent certificate in English.

14 Support for Student Learning

This degree programme will be delivered in collaboration with the Singapore Institute of Technology within the Nanyang Polytechnic campus in Singapore. During the first week of the first semester students attend an induction programme provided by Newcastle University and the Singapore Institute of Technology. New students will be given a general introduction to life as a Newcastle University student in Singapore, to the principal support services that will be available to students and to general information about 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.

Services and facilities available to support students' learning include the following:
- Degree Programme Handbook (including Degree Regulations and Module sheets);
- Nanyang Polytechnic library and Newcastle University's electronic Library;
- E-mail facilities;
- Extensive laboratories and computing facilities in Nanyang Polytechnic;

Study skills support
Students will develop a range of Personal Transferable Skills, including Study Skills, as outlined in this 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.

Academic support
The initial point of contact for a student is with a lecturer or module leader or their tutor in the first instance (see below for more generic issues). Thereafter the Degree Programme Director (Newcastle University) or Head of School (Newcastle University) 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 in Singapore whose responsibility is to monitor the academic performance and overall well-being of their tutees. Details of the personal tutor system can be found at: http://www.ncl.ac.uk/quilt/assets/documents/qsh-personaltutoring-fwk.pdf.

In addition, Newcastle University and Nanyang Polytechnic offer a range of support services, details of which are available on the following websites:
For Newcastle University:
http://www.ncl.ac.uk/undergraduate/support/
For Nanyang Polytechnic:
http://www.nyp.edu.sg/

Support for students with disabilities
The Nanyang Disability Support Service provides help and advice for disabled students. It provides individuals with: advice about facilities, services and the accessibility of the 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
Newcastle University's main learning resources are provided by the Robinson Library (for books, journals, online resources), and by Information Systems and Services, which supports campus-wide computing facilities.
Students on this programme will have access to a wide range of computing facilities through Newcastle University's "Remote Access System" or ras.ncl.ac.uk. For more information see https://my.ncl.ac.uk/students/learning
Increasingly, library material is available electronically via remote access so some of Newcastle University's library holdings will be available to students in Singapore.

The Singapore Institute of Technology, through facilities available at Nanyang Polytechnic, provides an extensive and advanced library facility with access to media, e-books, databases, e-journals and many other information resources such as OPAC on their library catalogues. More information can be found at: http://library.nyp.edu.sg/

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 relevant Board of Studies in Newcastle University. Changes to, or the introduction of new modules are considered at the School of Mechanical and Systems Engineering Teaching and Learning Committee and consequently at the Board of Studies. Student opinion is sought at the Staff-Student Committee in Singapore, which reports back to Board of Studies, and/or by comments from students' representatives directly sent to the Board of Studies at Newcastle University. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and Learning Committee at Newcastle University.

Programme reviews
The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Teaching and Learning Committee.

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

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 in Singapore (see above).

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

Faculty and University Review Mechanisms
The programme is subject to Newcastle University's Internal Subject Review process, see http://www.ncl.ac.uk/aqss/qsh/internal_subject_review/index.php

Accreditation reports

Accreditation for this programme will be sought from:
- Institution of Mechanical Engineers (IMechE)
- Institution of Engineering and Technology (IET)

16 Regulation of assessment

Pass mark
The pass mark is 40

Course requirements
Progression is subject to the University's Undergraduate Progress Regulations and Undergraduate Examination Conventions. In summary, students must pass, or be deemed to have passed, 120 credits at both Stages. At Stage 2 there is limited compensation up to 40 credits and down to a mark of 35 is possible. There are resit opportunities at Stage 2 (with certain restrictions). At Stage 3 students are awarded an Honours degree as of right as long as they have no more than 20 failed credits beyond Stage 1 and the end of Stage 3 average is not less than 40.

Weighting of stages
The marks from Stages 2 and 3 will contribute to the final Honours classification of the degree in the ratio 1:2.

Common Marking Scheme
The University employs a common marking scheme, which is specified in the Undergraduate Examination Conventions, namely

	Honours
<40	Fail
40-49	Third Class
50-59	Second Class, Second Division
60-69	Second Class, First Division
70+	First Class

Role of the External Examiner
External Examiners, distinguished members of the subject community, are appointed by Faculty Teaching and Learning Committee, after recommendation from the Board of Studies. The External Examiners are expected to:

See and approve examination papers
Moderate examination and coursework marking
Attend the Board of Examiners
Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:
The University Prospectus (see http://www.ncl.ac.uk/undergraduate/) The School Brochure (contact enquiries@ncl.ac.uk) The University Regulations (see http://www.ncl.ac.uk/calendar/university.regs/) The Degree Programme Handbook (http://www.ncl.ac.uk/mech/undergrad/programme/contents.htm) Nanyang Polytechnic general information: http://www.ntu.edu.sg

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

Intended Learning Outcome	Covers UK Spec SLO	Module codes (Comp/Core in Bold)
A1	US1	**MEC2101, MEC2107** **MEC3102, MEC3104**
A2	US2	**MEC2101** **MEC3101**
A3	EA1	**MEC2102, MEC2103, MEC2105, MEC2107** **MEC3101, MEC3102, MEC3103, MEC3104, MEC3105, MEC3190**
A4	ES1	**MEC2103, MEC2106** **MEC3103, MEC3106**
A5	ES2	**MEC2106** **MEC3106**
A6	ES3	**MEC2103, MEC2104, MEC2105, MEC2107** **MEC3103, MEC3104, MEC3190**
A7	EP1	**MEC2102, MEC2103, MEC2104** **MEC3103, MEC3104, MEC3190**
B1	US1	**MEC2102, MEC2104, MEC2107** **MEC3102, MEC3104**
B2	US2	**MEC2101, MEC2102** **MEC3101, MEC3190**
B3	US3	**MEC2104, MEC2105, MEC2107** **MEC3102, MEC3103, MEC3104, MEC3105, MEC3190**
B4	EA2	**MEC2101, MEC2102, MEC2103, MEC2104, MEC2105, MEC2107** **MEC3101, MEC3102, MEC3105**
B5	EA4	**MEC2102, MEC2103, MEC2105, MEC2107** **MEC3101, MEC3103, MEC3106, MEC3190**
B6	D1	**MEC2103** **MEC3103, MEC3104, MEC3190**
B7	D2	**MEC2103** **MEC3103**
B8	D5	**MEC2103, MEC2104** **MEC3103**
B9	D6	**MEC2103** **MEC3103**
B10	ES2	**MEC2106** **MEC3106**
B11	EP3	**MEC2106** **MEC3105, MEC3106, MEC3190**
C1	EA3	**MEC2101, MEC2102, MEC2103, MEC2104** **MEC3101, NEC3102, NEC3103, MEC3104, MEC3105, MEC3190**
C2	D3	**MEC2103, MEC2106** **MEC3103, MEC3106**
C3	ES4	**MEC2103, MEC2106** **MEC3103, MEC3106, MEC3190**
C4	EP5	**MEC2103, MEC2106** **MEC3106**
C5	EP6	**MEC2103, MEC2107** **MEC3103, MEC3190**
C6	EP7	**MEC2101, MEC2103** **MEC3101, MEC3106**
C7	EP8	**MEC2102, MEC2103, MEC2104, MEC2107** **MEC3101, MEC3102, MEC3190**

D1	D2	**MEC2103** **MEC3103, MEC3104, MEC3105, MEC3106**
D2	D4	**MEC2102** **MEC3103**
D3	ES5	**MEC2103, MEC2106** **MEC3106**
D4	EP2	**MEC2102, MEC2103, MEC2104, MEC2105**
D5	EP4	**MEC2102, MEC2103, MEC2104, MEC2105, MEC2106, MEC2107** **MEC3101, MEC3102, MEC3103, MEC3104, MEC3105, MEC3106, MEC3190**

* Core module MEC3190 may cover other Intended Learning Outcomes depending on topic set.

Or

BEng Stage 2 Singapore					
Module	**Type**	**A**	**B**	**C**	**D**
MEC2101	Comp	2	2, 4	1, 6	-
MEC2102	Comp	1, 3, 7	1, 2, 4, 5	1, 7	4, 5
MEC2103	Comp	3, 4, 6, 7	4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7	1, 2, 3, 4, 5
MEC2104	Comp	6, 7	1, 3, 4, 8	1, 7	4, 5
MEC2105	Comp	3, 6	3, 4, 5	-	4, 5
MEC2106	Comp	4, 5	10, 11	2, 3, 4	3, 5
MEC2107	Comp	1, 3, 6	1, 3, 4, 5	5, 7	5
Stage 3 Singapore					
MEC3101	Comp	2, 3	2, 4, 5	1, 6, 7	5
MEC3102	Comp	1, 3	1, 3, 4	1, 7	5
MEC3103	Comp	3, 4, 6, 7	3, 5, 6, 7, 8, 9	1, 2, 3, 5	1, 2, 5
MEC3104	Comp	1, 3, 6, 7	1, 3, 6	1	1, 5
MEC3105	Comp	3	3, 4, 11	1	1, 5
MEC3106	Comp	4, 5	5, 10, 11	2, 3, 4, 6	1, 3, 5
MEC3190	Core	3, 6, 7	2, 3, 5, 6, 11	1, 3, 5, 7	5