Programme Specification for

MSc Mechatronic Systems Engineering

1. Programme title	MSc Mechatronic Systems Engineering
2. Awarding institution	Middlesex University
3. Teaching institution	Middlesex University
4. Details of accreditation by professional/statutory/regulatory body	
5. Final qualification	MSc / PgDip / PgCert Mechatronic Systems Engineering
6. Year of validation **Year of amendment**	
7. Language of study	English
8. Mode of study	FT / PT

9. Criteria for admission to the programme

The programme is offered as a conversion course for graduates with a good honours degree (2:2 or equivalent) in a numerate discipline (e.g. mathematics, physics, chemistry, information systems, computer science etc.). We will also consider graduates with a strong technical design focus (Product Design, Industrial Design, Automotive Design, etc.) after interview. Engineering graduates from disciplines such as robotics and mechatronics may not find this programme suitable. Preference will be given to graduates with industrial experience.

Candidates without formal qualifications need to demonstrate relevant work experience and the ability to study at postgraduate level.

In addition candidates will have such qualities as being creative, proactive and having a desire to engage with the curriculum, and be able to think as an individual but able to work in a team. Candidates should be able to show a keen interest in engineering, particularly the emerging technologies in all its aspects. It is strongly advised that the applicants address these in their personal statement in their application.

Successful applicants must have competence in English language. For international applicants whose first language is not English the requirement is that they have IELTS 6.5 (with minimum 6.0 in each components) or an equivalent qualification recognised by Middlesex University.

10. Aims of the programme

The programme aims to take graduates of numerate disciplines and equipping them with the relevant knowledge and skills necessary to practise as Mechatronic Systems Engineers, fulfilling

the employment opportunities created by the emerging technologies that are transforming the workplace with concepts such as smart automation systems and smart factories.

11. Programme outcomes	
A. Knowledge and understanding On completion of this programme the successful student will have knowledge and understanding of : 1. Distributed systems for smart factories. 2. Critical awareness of the emerging technologies involved smart automation systems. 3. Developing control systems for complex mechatronic solutions. 4. Techniques in developing system integration strategies for large scale automated systems such as smart factories. 5. Engineering simulation methods such as discrete event and real-time control. 6. Evaluation methods and research for achieving optimal mechatronics systems behaviour. 7. Professional responsibilities including the global, social, ethical and environmental context of engineering.	**Teaching/learning methods** Students gain knowledge and understanding through combination of directed learning, project-led curriculum as well as task-based learning and will make substantial use of industry provided resources. The industry partners selected are renowned for their excellent training material and online resource, which will form some of the specialist curriculum material. **Assessment methods** Students' knowledge and understanding is assessed by project work, hands-on-tasks, coursework, oral and visual presentations and project reports (individual and group).
B. Cognitive (thinking) skills On completion of this programme the successful student will be able to: 1. Creatively solve complex automation problems. 2. Demonstrate critical thinking in order to solve real industrial problems. 3. Systematise a problem, recognise its constraints, and design an effective solution. 4. Critically evaluate and the performance of mechatronic systems and devise improvement strategies.	**Teaching/learning methods** Students develop their cognitive skills through completing mini-projects, problem solving activities, oral presentations and through report writing. **Assessment methods** Students' cognitive skills are assessed by a combination of individual and collaborative project work comprising of written reports and oral presentations that demonstrate sound judgement and self-critical analysis.
C. Practical skills On completion of the programme the successful student will be able to: 1. Select appropriate technology solutions for mechatronics systems. 2. Produce prototype systems to test, evaluate	**Teaching/learning methods** Students learn practical skills through individual and collaborative projects, task-based exercises and by participating in workshop activities organised in collaboration with industry partners.

and optimise. 3. Research, communicate and justify ideas for system level solutions. 4. Use simulation to analyse and make systems level improvements. 5. Use a range of key software and hardware skills required in mechatronics systems. Additionally students completing the MSc will be able to: 6. Design and develop fully integrated solutions for a given problem or a challenge, including implementation strategies and associated costs.	**Assessment methods** Students' practical skills are assessed by comprising of individual and group projects, assignments, and presentations (individual and group).
D. Graduate skills On completion of this programme the successful student will be able to: 1. Communicate orally via professional presentations. 2. Communicate via professional written reports. 3. Work successfully within a team, demonstrating an ability to deal with personal differences and supporting other colleagues. 4. Demonstrate competence and responsibility through mastering problems typically faced in working with emerging technologies. Additionally students completing the MSc will be able to: 5. Work independently and autonomously at a level appropriate for a mechatronic systems engineer in dealing with familiar and unfamiliar problems.	**Teaching/learning methods** Students acquire graduate skills throughout the programme. With the completion of the programme, they will have become autonomous as well as effective collaborative learners. **Assessment methods** Students' graduate skills are assessed by reports, log books, demonstration videos, presentations, individual and team projects.

12. Programme structure (levels, modules, credits and progression requirements)

12. 1 Overall structure of the programme

Term 1	PDE4501 Mechatronics Systems (Hardware and Software Portfolio) [60 credits]
Term 2	PDE4502 Mechatronics Systems (Systems Integration Portfolio) [60 credits]
Term 3	PDE4503 Individual Project [60 credits]

12.2 Levels and modules

Starting in academic year 2010/11 the University is changing the way it references modules to state the level of study in which these are delivered. This is to comply with the national Framework for Higher Education Qualifications. This implementation will be a gradual process whilst records are updated. Therefore the old coding is bracketed below.

Level 7 (4)

COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: PDE4501 Mechatronics Systems (Hardware and Software Portfolio) [60 credits] PDE4502 Mechatronics Systems (Systems Integration Portfolio) [60 credits] PDE4503 Individual Project [60 credits]		For the named PgCert award students must complete PDE4501. For the named PgDip award students must complete all four of PDE4501cand PDE45012. Students must obtain 120 credits at level 7 in order to progress onto PDE4503 Individual Project.

12.3 Non-compensatable modules (note statement in 12.2 regarding FHEQ levels)

Module level	Module code

7	PDE4501, PDE4502, PDE4503

13. Curriculum map

See page 15

14. Information about assessment regulations

Please refer to the University Regulations for generic guidance, and the Programme Handbook, under the Assessment section, for additional information.

15. Placement opportunities, requirements and support (if applicable)

There is no placement requirement for this programme. However, the programme will arrange industrial visits and seek relevant industrial partnerships. There will be strong involvement from industrial partners in terms of sponsored projects and specialist lectures.

16. Future careers (if applicable)

Graduates from the programme will be expected to enter into employment that requires high level skills in mechatronic system design and integration with highly specialised practical skills in automated production solutions that are much sought after worldwide. The programme content will be enriched by keeping industrial partners' engagement active and offering sponsored projects. This will also help to support students regarding current opportunities and future trends in their relevant employment sector.

17. Particular support for learning (if applicable)

Meeting the learning outcomes of this programme requires active participation in the subject and the development of autonomous practice in meeting objectives. Supporting this level of active participation and autonomous practice is achieved via regular weekly contact with academic staff, productive and informed support from technical staff and the use of online, resource-based learning materials provided in-house as well as from industry partners supporting the programme.

The subject provides extensive facilities where students can engage with their coursework assignments in a supported and productive environment.

18. JACS code (or other relevant coding system)	H730
19. Relevant QAA subject benchmark group(s)	Engineering (2015)

20. Reference points

- Transition to Engineering: Engineering conversion courses for graduates with a

non-engineering first-degree, HEFCE (September 2015)

- QAA Engineering subject benchmark statement (2015)
- QAA Framework for Higher Education Qualifications in England, Wales and Northern Ireland
- Middlesex University Regulations
- Middlesex University Learning and Quality Enhancement Handbook
- Chartered Engineer and Incorporated Engineer Standard, Engineering Council UK, 2014;
- UK Standard for Professional Engineering Competence;
- The Accreditation of Higher Education Programmes, Engineering Council UK, 2014;
- IED Engineering Design Specific Learning Outcomes for EC(UK) Accredited Degree Programmes.

21. Other information

This programme is developed in response to a successful call by HEFCE in Engineering Conversion Pilot Scheme (September 2015).

Please note programme specifications provide a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve if s/he takes full advantage of the learning opportunities that are provided. More detailed information about the programme can be found in the rest of your programme handbook and the university regulations.

Appendix 2: Curriculum map for MSc Mechatronic Systems Engineering

This section shows the highest level at which programme outcomes are to be achieved by all graduates, and maps programme learning outcomes against the modules in which they are assessed.

Programme learning outcomes

Knowledge and understanding		**Practical skills**	
A1	Distributed systems for smart factories.	C1	Select appropriate technology solutions for mechatronics systems.
A2	Critical awareness of the emerging technologies involved smart automation systems.	C2	Produce prototype systems to test, evaluate and optimise.
A3	Developing control systems for complex mechatronic solutions.	C3	Research, communicate and justify ideas for system level solutions.
A4	Techniques in developing system integration strategies for large scale automated systems such as smart factories.	C4	Use simulation to analyse and make systems level improvements.
A5	Engineering simulation methods such as discrete event and real-time control.	C5	Use a range of key software and hardware skills required in mechatronics systems.
A6	Evaluation methods and research for achieving optimal mechatronics systems behaviour.	C6	Design and develop fully integrated solutions for a given problem or a challenge, including implementation strategies and associated costs.
A7	Professional responsibilities including the global, social, ethical and environmental context of engineering.		
Cognitive skills		**Graduate Skills**	
B1	Creatively solve complex automation problems.	D1	Communicate orally via professional presentations.
B2	Demonstrate critical thinking in order to solve real industrial problems.	D2	Communicate via professional written reports.
B3	Systematise a problem, recognise its constraints, and design an effective solution.	D3	Work successfully within a team, demonstrating an ability to deal with personal differences and supporting other colleagues.
B4	Critically evaluate and the performance of mechatronic systems and devise improvement strategies.	D4	Demonstrate competence and responsibility through mastering problems typically faced in working with emerging technologies.
		D5	Work independently and autonomously at a level appropriate for a mechatronic systems engineer in dealing with familiar and unfamiliar problems.

Programme outcomes																						
A 1	A 2	A 3	A 4	A 5	A 6	A 7	B 1	B 2	B 3	B 4	C 1	C 2	C 3	C 4	C 5	C 6	D 1	D 2	D 3	D 4	D 5	D 6
Highest level achieved by all graduates																						
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7

Module Title	Module Code by Level	Programme outcomes												
		A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	C1	C2
Mechatronics Systems (Hardware and Software Portfolio)	PDE4501	X	X			X			X				X	
Mechatronics Systems (Systems Integration Portfolio)	PDE4502	X	X	X	X	X	X		X		X		X	
Individual Project	PDE4503	X	X	X	X	X	X	X	X	X	X	X	X	X