UNIVERSITY of BRADFORD

Faculty of Engineering and Informatics

Department of Mechanical and Energy Systems Engineering

Programme Specification

Programme title: MSc Engineering and Process Excellence

Academic Year:	2019-2020
Degree Awarding Body:	University of Bradford
Partner(s), delivery organisation or support provider (if appropriate):	
Final and interim award(s):	*[Framework for Higher Education Qualifications (FHEQ) level 7]* **Master of Science Engineering and Process Excellence** **MSc Engineering** **Postgraduate Diploma Engineering and Process Excellence** **Postgraduate Certificate Engineering and Process Excellence**
Programme accredited by (if appropriate):	
Programme duration:	3 years P/T Extramural / work based learning **This programme is only available to delegates participating on the JLR TAS[1] scheme or from other companies through the UK ASAS[2] scheme**
QAA Subject benchmark statement(s):	
Date of Senate Approval:	
Date last confirmed and/or minor modification approved by Faculty Board	2015/16

Please note: This programme specification has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but changes may occur given the interval between publishing and commencement of teaching. Any change which impacts the terms and conditions of an applicant's offer will be communicated to them. Upon commencement of the programme, students will receive further detail about their course and any minor changes will be discussed and/or communicated at this point.

[1] JLR TAS – Jaguar Land Rover Technical Accreditation Scheme

[2] ASAS – Advanced Skills Accreditation Scheme

Introduction

In a highly competitive marketplace, engineering organisations strive to develop products with ever-increasing complexity and technological sophistication, more able to meet consumer and societal needs, and environmental concerns, in a cost conscious manner. Business success fundamentally depends on the ability of the engineering organisations to manage their Product Creation Process, covering design, development and volume production, in a way that ensures a flawless delivery of complex products that perform their intended function in a robust and reliable way.

In order to achieve this in a context dominated by fast pace innovation and technology advancement, emphasis is placed on developing engineering competencies and skills that focus on complex systems integration concurrently through design and manufacturing. Within engineering employers there is now a strong demand and focus on systems engineering skills, structured problem solving, variability reduction in products and processes, in order to facilitate the delivery of products Right First Time Through Design. This has led to the universal adoption of strategies like Six Sigma and Lean, as a disciplined approach to problem resolution on complex issues and for optimisation of design and operational performance.

This programme is targeted at engineering employees who wish to develop a high level of competence in engineering quality improvement tools and processes that underpin excellence in engineering Product Creation Process, through a structured programme of postgraduate accredited training, workplace based learning and research.

The Faculty of Engineering and Informatics has strong and well established links with industry. The Bradford Engineering Quality Improvement Centre (BEQIC), which is part of the School's Automotive Research & Knowledge Transfer Centre, has operated continuously since 1994 as a collaborative partnership with the global automotive industry. BEQIC is staffed by academics with an interest in the application of engineering quality improvement disciplines to product development and manufacturing, as well as industry experts who contribute the wealth of their experience and expertise. This gives a unique strength to the BEQIC approach: the synergy between academic rigour and practical industrial expertise results in an innovative yet focused and pragmatic problem solving approach, consistent and comprehensive in addressing business needs.

This programme is aligned with the Jaguar Land Rover (JLR) Technical Accreditation Scheme (TAS) launched in 2010 as a focused programme of advanced technical skills and Post-Graduate Development for JLR engineers. The TAS programme is delivered by a Consortium of Universities including Warwick, Loughborough, Cranfield, Coventry, York and Southampton, covering key competency areas such as Powertrain design, Hybrids, Computer Simulation, Electronics and Sustainable product design. Under the TAS framework, JLR engineers can combine modules from the participating Universities towards a Post Graduate award. A national Advanced Skills Accreditation Scheme has been subsequently launched with participation from multi-sector UK manufacturing companies, administered through SEMTA.

Programme Aims

The programme is intended to:

- Widening access to Higher Education with academic accreditation and recognition through a programme of blended learning of formal modules, academically accredited CPD training and experiential learning at your workplace;
- Developing and supporting you as an autonomous learner, capable of:
    - Managing and critically evaluating your learning;
    - Undertaking work-based projects which meet your learning needs, those of your employer or sponsor, and fulfil the University's academic requirements;
- Providing you and your employer with opportunities and a framework to negotiate an individual programme of study which is focused on knowledge and skills relevant to your workplace.

The programme framework aims to benefit both you (the student) and the employer:

You will -

- Deal with complex issues both systematically and creatively, make sound judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences
- Demonstrate self-direction and originality in tackling and solving problems and act autonomously in planning and implementing tasks at a professional or equivalent level.
- Continue to develop and enhance personal technical, research and motivational skills;
- Master the understanding and application of modern specialist tools and techniques;
- Learn from expert guidance in up-to-date engineering knowledge.

Your employer will benefit from:

- Integration of academic standards of learning and research into the workplace;
- Stimulation of technical maturity development of their engineering workforce, and establishment of an academically rigorous process for assessing competency in terms of knowledge and skills;
- Identification of potential efficiency and cost savings and improvement of products and processes by applying world-class professional knowledge and expertise.

Programme Learning Outcomes

To be eligible for the award of Postgraduate Certificate at FHEQ level 7, students will be able to:

LO1 Demonstrate the ability to, plan, schedule and report an engineering improvement task in a workplace context and to critically evaluate on the actions;

LO2 Demonstrate a critical understanding of the attributes of structured processes for engineering problem solving underpinned by the scientific method;

LO3 Demonstrate a comprehensive understanding and mastery of the skills required for the application of the structured tools that support a function based approach in systems engineering design and integration in Product Creation Process;

LO4 Demonstrate originality and a critical understanding in the application of the advanced statistical based engineering methodologies that underpin problem solving, problem prevention, research in product design and development, and production and process control;

LO5 Demonstrate comprehensive understanding and mastery of engineering business and management skills, including teamwork facilitation and leadership;

LO6 Demonstrate advanced data management and presentation skills, underpinned by mastery of specialised statistical packages such as Minitab.

Additionally, to be eligible for the award of Postgraduate Diploma at FHEQ level 7, students will be able to:

LO7 Demonstrate a depth and breadth of understanding in advanced engineering expertise, appreciation of wider multidisciplinary engineering context, and the ability to integrate knowledge and understanding from different engineering disciplines to creative problem solving in the workplace;

Additionally, to be eligible for the award of Degree of Master at FHEQ level 7, students will be able to:

LO8 Demonstrate understanding and application of research and effective technical reporting skills;

Curriculum

Postgraduate Certificate

Advanced Integrated Problem Solving Curriculum

The aim of this part of the curriculum is to develop mastery of fundamental engineering quality improvement skills, with a sharp focus on structured problem solving and statistically based engineering methodologies in engineering and process improvement. This part of the curriculum will cover an enhanced Body of Knowledge underpinning Six Sigma Black Belt training for engineers in product development and advanced manufacturing.

This part of the curriculum is based on 6 modules (1 core and 5 optional of which the students must choose at least 4) totalling 60 credits. All modules are delivered in a short course style, typically of 5 days duration for the 20 credit module, and 3.5 days for the 10 credit modules. For all modules the assessment is based on a workplace based project.

A Postgraduate Certificate (PGCert) would only be awarded if you successfully complete this part of the curriculum and decide not to progress to the next stage.

FHEQ Level	Module Title	Type (Core/ Option/ Elective)	Credits	Semester (s)	Module Code
7	Integrated Problem Solving using Six Sigma Methodology	C	20	1-2-3	MAE7025-B
7	Advanced Statistics for Engineers	O	10	1-2-3	MAE7023-A
7	Design of Experiments and Response Surface Modelling	O	10	1-2-3	MAE7024-A
7	Robust Engineering Systems Analysis and Failure Mode Avoidance	O	20	1-2-3	MAE7020-B
7	Reliability Life Data Analysis	O	10	1-2-3	MAE7022-A
7	Advanced Process Modelling and Analysis	O	10	1-2-3	MAE7027-A

					Programme Learning Outcomes						
Stage	Module		Credits	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO8
PgCert	MAE7025-B	C	20	A	A	A	A	A	A	A	S
PgCert	MAE7023-A	O	10	S	S	S	A	S	A	S	S
PgCert	MAE7024-A	O	10	S	S	S	A	S	A	S	S
PgCert	MAE7020-B	O	20	S	S	A	S	S		A	S
PgCert	MAE7022-A	O	10	S	S	S	A	S	A	S	S
PgCert	MAE7027-A	O	10	A	S	A	S	A	S	A	S

A = this outcome is formally assessed in the module

S = this outcome is explicitly supported in the learning and teaching but is not formally assessed

Students will be eligible to exit with the award of Postgraduate Certificate if they have successfully completed 60 credits and achieved the award learning outcomes.

Postgraduate Diploma

The learning objectives for this phase focuses on acquiring of advanced or specialised knowledge and skills relevant to the engineering functional area. In order to enable the required diversity of specialist technical areas this part of the curriculum is based on elective modules. The choice of elective modules will be discussed individually with you at the beginning of the programme, and will be confirmed with you and your employer (JLR), in particular in respect to the mode of attendance (for modules not currently offered as flexible short courses).

You will have the option to select modules listed in the table below offered by the University of Bradford in short course format. Jaguar Land Rover Delegates will have the option to study modules from the TAS approved list, listed in Appendix C, delivered by the TAS participating Universities - Warwick, Cranfield, Loughborough, Coventry, York and Southampton.

A Postgraduate Diploma (PgDip) in Engineering and Process Excellence would only be awarded if you have (i) successfully completed the Postgraduate Certificate phase of the curriculum, and (ii) successfully completed 60 credits from the PgDip curriculum, and (iii) decide not to progress to the next stage.

FHEQ Level	Module Title	Type (Core/ option/ elective)	Credits	Semester (s)	Module Code
7	Braking of Road Vehicles	O	10	1-2-3	MAE7021-A
7	Coaching Development for Engineering and Process Improvement	O	20	1-2-3	MAE7026-B
7	Braking system NVH	O	10	1-2-3	MAE7028-A
7	Advanced Geometric Design and Tolerancing	O	10	1-2-3	MAE7029-A

					Programme Learning Outcomes						
Stage	Module		Credits	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO8
PgDip	MAE7021-A	O	10							A	
PgDip	MAE7026-B	O	20	S	S	S		A		S	S
PgDip	MAE7028-A	O	10							A	
PgDip	MAE7029-A	O	10	S	A	S	A	S	S	S	S

A = this outcome is formally assessed in the module

S = this outcome is explicitly supported in the learning and teaching but is not formally assessed

Students will be eligible to exit with the award of Postgraduate Diploma if they have successfully completed at least 120 credits and achieved the award learning outcomes.

Degree of Master

FHEQ Level	Module Title	Type Core/ option/ elective	Credits	Semester (s)	Module Code
7	MSc Project	C	60	Year	ENG7002-E

					Programme Learning Outcomes						
Stage	Module		Credits	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO8
MSc	ENG7002-E	C	60	A	A	A	A		S	A	A

A = this outcome is formally assessed in the module

S = this outcome is explicitly supported in the learning and teaching but is not formally assessed

Students will be eligible for the award of Degree of Master if they have successfully completed at least 180 credits and achieved the award learning outcomes.

The curriculum may change, subject to the University's programme approval, monitoring and review procedures.

Learning and Teaching Strategy

The PgCert and PgDip core modules will be delivered in a short course style, through a combination of formal presentations and hands-on case-studies. The short course learning materials (both lecture notes and case studies) use a coherent problem-based approach, introducing concepts, principles and tools in a realistic context of an Engineering scenario. The assessment for all of these modules is via a technical report based on workplace based projects, which details the application of the learning on a real world engineering problem. You will be supported in the workplace by both academic and company mentoring by a resident technical expert (e.g. a Six Sigma Master Black Belt).

For larger modules (e.g. 20 credits, taking more than 3 months to complete) progress will be monitored through monthly gateway reviews in the workplace.

The workplace based project module will provide you with the opportunity to develop and enhance personal research, technical and motivational skills. This module will include a 3-day induction in short course style, focusing on project definition, research methods and academic report writing. The main part of the module will be based on independent experiential learning developed around a workplace based project. Each student will be allocated 1 or 2 academic supervisors to support the project work and the project write-up. Guidance in the workplace will be from an experienced mentor (e.g. a Master Black Belt). A structured programme of gateway reviews will be operated to monitor progress and provide feedback and guidance to the students.

Teaching Map see – Appendix A

Assessment Strategy

The assessment will be based on the individual project, and will include an oral presentation at a Conference event organised at the Company.

Assessment Map see - Appendix B

Assessment Regulations

This Programme conforms to the standard University Assessment Regulations which are available at the link below

https://www.brad.ac.uk/aqpo/documents-templates-and-downloads/a-z/reg-9-postgradregs201718.pdf

However, there are exception(s) to these regulations as listed below:

To be eligible for an accredited[3] Masters Degree, with the title *MSc Engineering & Process Excellence*,

- You must achieve at least 50% in 160 credits and 40% in the other 20 credits

To be eligible for a non-accredited Masters Degree, with the title: *MSc Engineering*

- You must achieve at least 40% in 160 credits and 35% in the other 20 credits.

Postgraduate students are entitled to do supplementary assessment as follows:

- For the accredited award, you are permitted one supplementary attempt in any of the taught modules failed or below 50%, at the next available opportunity, but not in the MSc Project. You may therefore re-sit a module that has a mark in the 40% to 50% range for the purpose of remaining on the accredited award.
- For the non-accredited award, you are permitted one supplementary attempt in any of the taught modules failed (<40%), including the MSc Project.
- However, in both cases above, the re-sit mark will be capped at 35% for the purpose of calculating the award average for the potential awards with Merits or Distinctions.

If you attain an overall weighted average of at least 58.0% at the initial attempt, including at least 60.0% at the initial attempt in any dissertation/ project, you will be eligible for the award of the Degree of Master with Merit.

If you attain an overall weighted average of at least 68.0% at the initial attempt, including at least 70.0% at the initial attempt in any dissertation/ project, you will be eligible for the award of the Degree of Master with Distinction.

Admission Requirements

The University welcomes applications from employees of JLR and other companies regardless of their previous academic experience; offers are made following detailed consideration of each individual application. Most important in the decision to offer a place is our assessment of a candidate's potential to benefit from their studies and of their ability to succeed on this particular programme. Consideration of your application will be based on a combination of your academic qualifications and your relevant experience.

If you have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate this learning in order to provide you with exemptions from specified modules contained within the curriculum. The University of Bradford has always welcomed applications from disabled students, and these will be considered on the same academic grounds as are applied to all applicants. If you have some form of disability you may wish to contact the programme leader before you apply.

Given the strong workplace based learning component for this programme, it is expected that applicants will be recommended by their companies, or at least provide evidence that the company or organisation agrees to support the student's learning in the workplace

[3] The JLR TAS scheme has been approved by the IMechE and the IET for accredited MPDS.

The University welcomes applications from all potential students and most important in the decision to offer a place is our assessment of a candidate's potential to benefit from their studies and of their ability to succeed on this particular programme. Consideration of applications will be based on a combination of formal academic qualifications and other relevant experience.

Applications are welcome from students with non-standard qualifications or mature students (those over 21 years of age on entry) with significant relevant experience.

Recognition of Prior Learning

If applicants have prior certificated learning or professional experience which may be equivalent to parts of this programme, the University has procedures to evaluate and recognise this learning in order to provide applicants with exemptions from specified modules or parts of the programme.

Minor Modification Schedule

Version Number	Brief description of Modification	Date of Approval (Faculty Board)
1	Signed off document	5th November 2014 LTC
2	Minor Modifications to modules for 2016/17	FLTC 2015/16

Appendix A:

Teaching map

This table shows the main delivery methods which are used across modules and stages:

		Teaching methods			
Stage	**Module**	**1**	**2**	**3**	**4**
PgCert	MAE7025-B	X	X	X	X
PgCert	MAE7023-A	X	X		X
PgCert	MAE7024-A	X	X		X
PgCert	MAE7020-B	X	X	X	X
PgCert	MAE7022-A	X	X		X
PgCert	MAE7027-A	X	X		X
PgDip	MAE7021-A	X	X		
PgDip	MAE7026-B	X	X	X	X
PgDip	MAE7028-A	X	X		
PgDip	MAE7029-A	X	X		X
MSc	ENG7002-E	X	X		X

Methods of assessment:

1 – Formal Lectures;

2 – Seminars / Tutorials and Class Examples;

3 – Group work;

4 – Directed / coached workplace based learning;

Appendix B:
Assessment map

This table shows the methods of assessments used across different stages and modules:

		Methods of assessment			
Stage	**Module**	**1**	**2**	**3**	**4**
PgCert	MAE7025-B	X			
PgCert	MAE7023-A	X			
PgCert	MAE7024-A	X			
PgCert	MAE7020-B	X			
PgCert	MAE7022-A	X			
PgCert	MAE7027-A	X			
PgDip	MAE7021-A	X			
PgDip	MAE7026-B	X	X		
PgDip	MAE7028-A	X			X
PgDip	MAE7029-A	X			
MSc	ENG7002-E			X	

Methods of assessment:

1 – Coursework / report;

2 – Formal exam;

3 – Research Dissertation;

4 – Portfolio of Evidence.

Appendix C:

List of TAS Approved Modules [PgDip Elective Modules delivered by TAS University partners]

University Provider	Module Titles	CATS Points
Aston	Communicating Knowledge	15
Coventry	Associative Vehicle Architecture (AVA) Creator Competency	15
Coventry	Control Systems 1 - Introduction to Design Methods	15
Coventry	Control Systems 2 - Use of Matlab / Simulink	15
Coventry	Control Systems 3 -Design, Real-Time Systems and Implementation	15
Coventry	Durability & Reliability 1	15
Coventry	Durability & Reliability 2 - Advanced	15
Coventry	Engineering Analysis & Simulations	15
Coventry	Structure, Safety and Impact Analysis	15
Coventry	Vehicle Dynamics 1	15
Coventry	Vehicle Dynamics 2	15
Coventry	Vehicle Safety	15
Cranfield	Advanced CAE Applications	10
Cranfield	Advanced Control and Optimisation	10
Cranfield	Advanced Engineering Analysis	10
Cranfield	Applied Automotive Control	10
Cranfield	CAE Applications (previously called Advanced CAD)	10
Cranfield	CFD a Comprehensive Introduction	15
Cranfield	CFD Automotive Applications Research Project	15
Cranfield	CFD for Automotive Applications	10
Cranfield	Disc Brake Design and Analysis	10
Cranfield	Implementation of Automotive Control Systems	10
Cranfield	Mechatronics Modelling For Automotive Systems	10
Cranfield	Transmission & Driveline	15
Loughborough	Calibration and Emissions	15
Loughborough	Driver & Vehicle Ergonomics	15
Loughborough	Manufacturing Systems and Integrated Design	20
Loughborough	Sustainable Product Design	10
Loughborough	Sustainable Use of Materials	15
Loughborough	Sustainable Vehicle Powertrains	20
Loughborough	System Design	15
Loughborough	System Validation & Verification	15
Loughborough	Vehicle & Powertrain Functional Performance	20
Southampton	Advanced Automotive NVH	15

University Provider	Module Titles	CATS Points
Warwick	Advanced Test Techniques for Electrical Systems and Software	15
Warwick	Automotive Body Joining for Lightweight Structures	15
Warwick	Automotive Diagnostics	15
Warwick	Automotive Networking	15
Warwick	Concepts of Advanced Programme & Project Management	15
Warwick	Dimensional Measurement and Management	15
Warwick	Hybrid System Technologies	18
Warwick	Hybrid Vehicle Practical Component Testing	15
Warwick	Innovation	10
Warwick	International Joint Ventures	10
Warwick	Lightweight Materials for Automotive Applications	15
Warwick	Logistics & Operations Management	10
Warwick	Principles of Perceived Quality	15
Warwick	Project Planning, Management & Control	15
Warwick	Robust Automotive Electronics	15
Warwick	Robust Automotive Software	15
Warwick	Sheet Metal Forming	15
Warwick	Strategic Marketing	10
Warwick	System Modelling & Simulation	15
York	Foundations of Systems Safety Engineering	10
York	Hazard & Risk Assessment	10
York	Systems Safety Assessment	10