OFFICE USE ONLY	
Date of validation event:	05 February 2018
Date of approval by Academic Board:	19 June 2018
Approved Validation Period:	*5 years from September 18*
Date and type of revision:	30/4/20 AB approval of Partner Provider - Dimensions International College – refer to Appendix 1

PART TWO PROGRAMME SPECIFICATON

MSc Engineering:
MSc Engineering (Aeronautical)
MSc Engineering (Mechanical Manufacture)
MSc Engineering (Automotive)
MSc Engineering (Composite Materials)
MSc Engineering (Renewable & Sustainable Energy)
MSc Engineering (Electrical & Electronic)
MSc Engineering (Mechatronics)

1	**Awarding body**
	Glyndŵr University
2	**Programme delivered by**
	Glyndŵr University
3	**Location of delivery**
	Plas Coch Campus, Wrexham
4	**School/Department**
	Applied Science, Computing & Engineering
5	**Exit awards available**
	MSc Engineering (Aeronautical) MSc Engineering (Mechanical Manufacture) MSc Engineering (Automotive) MSc Engineering (Composite Materials) MSc Engineering (Renewable & Sustainable Energy) MSc Engineering (Electrical & Electronic) MSc Engineering (Mechatronics) PG Dip Engineering (Aeronautical) PG Dip Engineering (Mechanical Manufacture) PG Dip Engineering (Automotive) PG Dip Engineering (Composite Materials) PG Dip Engineering (Renewable & Sustainable Energy) PG Dip Engineering (Electrical & Electronic) PG Dip Engineering (Mechatronics) PG Cert Engineering

Students who enrol specifically for PG Cert, will be notified of the available modules prior to enrolment, depending on the available routes with viable student numbers.

6 Professional, Statutory or Regulatory Body (PSRB) accreditation

The programmes have been developed in line with PSRB requirements, including IMechE, IET, RAes & IE, refer to the university PSRB register for up to date details of current accreditation.

IMechE - http://www.imeche.org/
IET - http://www.theiet.org/
RAeS - http://aerosociety.com/
EI -www.energyinst.org/

7 Accreditation available

On achieving accreditation, it is intended that the programmes will lead to Chartered Engineer (CEng) status with the IMechE or IET or RAeS or EI (depending on programme studied)

8 Please add details of any conditions that may affect accreditation (e.g. is it dependent on choices made by a student?)

No

9 JACS3 codes

MSc Engineering (Aeronautical) H410 (Requires ATAS)
MSc Engineering (Mechanical Manufacture) H790
MSc Engineering (Automotive) H330 (Requires ATAS)
MSc Engineering (Composite Materials) H700
MSc Engineering (Renewable and Sustainable Energy) H220
MSc Engineering (Electrical and Electronic) H690
MSc Engineering (Mechatronics) H730

10 UCAS code

N/A

11 Relevant QAA subject benchmark statement/s

Subject Benchmark Statement Engineering February 2015
http://www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code

12 Other external and internal reference points used to inform the programme outcomes

General Regulations
Glyndŵr University Academic Regulations

The UK Standard for Professional Engineering Competence (UK-SPEC)

PSRB accreditation requirements and guidance

Subject Benchmark Statement Engineering February 2015
http://www.qaa.ac.uk/assuring-standards-and-quality/the-quality-code

The Higher Education Academy

https://www.international.heacademy.ac.uk/

13	**Mode of study**
	Full & part time
14	**Normal length of study**
	12 months full time or 18 months if January intake, 24 months part time
15	**Maximum length of study**
	2 Years fulltime or 30 months if January intake, 4 years part time
16	**Language of study**
	English

17 Criteria for admission to the programme

Standard entry criteria

Entry requirements are in accordance with the University's admissions policy https://www.glyndwr.ac.uk/en/media/FINAL%20ADMISSIONS%20POLICY%202020 17.pdf

The University's entry requirements are set out at http://www.glyndwr.ac.uk/en/Undergraduatecourses/UCAStariffchange2017/

International entry qualifications are outlined on the National Academic Recognition and Information Centre (NARIC) as equivalent to the relevant UK entry qualification.

In addition to the academic entry requirements, all applicants whose first language is not English or Welsh must demonstrate English language proficiency.

European students are able to provide this evidence in a number of ways (please see http://www.glyndwr.ac.uk/en/Europeanstudents/entryrequirements/ for details), including IELTS.

International students require a UKVI Approved Secure English Language Test (SELT) (please see http://www.glyndwr.ac.uk/en/Internationalstudents/EntryandEnglishLanguageRequirements/ for details).

Normal entry requirements for full time, part time, and semester 3 summer intake will be one of:

(a) A Bachelor of Engineering Honours degree, or other Bachelors Honours degree, normally with a 1st or 2nd class award in a relevant subject area;

(b) Academic qualifications at a lower level than honours degree but supported by a maturity of experience at a professional level in a relevant specialist area*;

(c) Equivalent qualifications of another overseas country which are deemed satisfactory by the program team.

Normally, the applicants applied through entry points (b) and (c) will be required to attend for an interview. This is not always possible, e.g. overseas students, in which case the application form and 'home' tutor's recommendations will be used to decide suitability; phone, internet and video conferencing may also be used. Places on the programmes will be offered on the basis of applicants' background qualifications and, where appropriate, experiences.

DBS Requirements

N/A

Non-standard entry criteria and programme specific requirements

According to the Regulations for Glyndŵr University: 'Taught Masters Degrees', it is possible for a non-graduate to be admitted to candidature provided that:

- he/she has a non-graduate qualification which Glyndŵr University has deemed to be of a satisfactory standard for the purpose of post graduate admission,

and

- he/she has held, for a minimum of two years, a responsible position which is relevant to the programme to be pursued within the previous five years.'

Irrespective of a candidate's entry qualifications, the student must provide evidence to the satisfaction of the interview panel of his/her ability to complete academic work of the required standard to complete successfully the scheme of study proposed.

18 Recognition of Prior (Experiential) Learning

Applicants may enter the programme at various levels with Recognition of Prior Learning (RPL) or Recognition of Prior Experiential learning (RPEL) in accordance with the University General Regulations. Any programme specific restrictions are outlined below

Programme specific restrictions

N/A

19 Aims of the programme

The programmes aim to facilitate the needs of a range of diverse industries at local, national and international levels, to provide them with potential future employees of the highest calibre. The programme has been devised to give students the opportunities to demonstrate their relevant technical expertise, innovation, commitment and sound judgment. Thereby producing students who are Engineering professionals and a sought after asset to future employers.

20 Distinctive features of the programme

The MSc in Engineering is designed to be accredited by Professional Bodies in order to provide a Chartered Engineer status. Please refer to the university PSRB register for up to date details of current accreditation.

IET -Institute of Engineering and Technology; IMechE -Institute of Mechanical Engineers;
RAS - Royal Aeronautical Society; EI - Energy Institute

Students can choose to develop their skills in particular aspects through their choice of MSc research project, which would be aligned with one of the *University Research Centre for Applied Science, Engineering and Computing's* specialist research groups.

Students who wish to study the PG Cert Engineering would enrol onto this programme as an intended award and would choose any three modules from within the routes. Students who have completed the PG Cert and wish to progress would then need to apply to enrol onto the MSc Engineering chosen route.

MSc Engineering (Aeronautical)
Aircraft aerodynamics and flying and handling performances are always the most important and challenging aspects for aircraft designs, particularly with the consideration of advanced materials and advanced aircraft technologies. At Glyndŵr University, the MSc Engineering (Aeronautical) programme will enable candidates to develop a deep understanding and solid skills in aerodynamics and aerodynamic design of aircraft, grasp detailed knowledge and application principles of composite materials and alloys, critically review and assess the application and practice of advanced materials in modern aircraft, model and critically analyse aircraft flight dynamic behaviour and apply modern control approaches for control-configured aircraft. Candidates will have access to state-of-art Merlin flight simulator for design and testing their own aircraft, will learn and use cutting-edge design, analysis and simulation software: MATLAB/Simulink, CATIA v5, ANSYS, and ABAQUS, and will have access to subsonic and supersonic wind tunnel facilities and rapid prototyping facilities. Glyndŵr University is located nearby to one of the largest aircraft company in the world, Airbus and also has close link with aviation industries, such as Rolls-Royce, Raytheon, Magellan, and Airbus. The MSc Engineering (Aeronautical) is aligned with accreditation requirements and guidelines for the Royal Aeronautical Society (RAeS) and the Institution of Mechanical Engineers (IMechE), and provide candidates the required training for registering for Chartered Engineers.

MSc Engineering (Mechanical Manufacture)
Government is focusing heavily on boosting the UK manufacturing industry; failure to meet demands for engineering skills could cost the UK £27bn a year. 58% of all new jobs will be STEM related, and the number of those studying for degrees in science, engineering and technology must increase by over 40% on current levels if demands are to be met. Of all STEM skills, those in mechanical and manufacturing engineering are becoming increasingly highly valued. Here at Glyndŵr University, we aim to ensure that the MSc Engineering (Mechanical Manufacturing) comprises fit-for-purpose teaching and research experience to provide a solid background for a career in the engineering and manufacturing industry sector. Many of the academic staff have industrial experience spanning a broad range of engineering areas and working levels. The programme is to be accredited by the Engineering Council and many students from previous years are now in jobs at top international companies such as Rolls-Royce, Siemens, Alstom, and Airbus.

The taught element of the programme includes design, and stress and fluid dynamics analysis, using state of the art commercial software: CATIA V5, ABAQUS and ANSYS. Students can choose to develop their skills in particular aspects through their choice of MSc research project, which would be aligned with one of the *University Research Centre for Applied Science, Engineering and Computing's* specialist research groups.

MSc Engineering (Automotive)
Glyndŵr University has a proven track of success in Automotive Engineering. The MSc Engineering (Automotive) programme contain a set of key modules covering the essential aspects of the automotive engineering field. This provides a solid background for a career in the automotive engineering and motorsport sector. Lecturers and supporting staff have the required industrial experience and are practitioners (i.e. track racing & car building)

The laboratories at Glyndwr University are equipped with up-to-date specialist equipment and vehicles.

The programme provides the opportunity to combine practical aspects as well as simulation based projects. The university operates a computer lab with industry relevant software, e.g. CATIA, ANSYS (Mechanical and CFD) or Abaqus.

An open and friendly atmosphere enhances the students' learning experience. Strong links to local, national and international companies ensure the standard of teaching is industry relevant and they provide students' with the best possible starting point into their professional career paths.

MSc Engineering (Composite Materials)
Much has been made of the use of composite materials in the aerospace industry with the Airbus A350XWB and the Boeing Dreamliner being headline news. However, the advantages of using composite materials can be extended to the majority of engineering areas and disciplines.

The rapid emergence of composites has revealed a difficulty in supplying the industry with Engineers that have the requisite knowledge of the materials. This MSc Engineering (Composite Materials) has been developed with that in mind. Students will learn the full lifecycle of components designed and manufactured with composites.

From first principles, potential students will learn the constituent parts of a composite material and understand the reasons for selecting each material. From there manufacturing methodologies will be understood. Design using composites will be taught after the different types of failure mechanisms are shown. Finally repair, recycling and disposal of composites will be discussed in detail.

Glyndŵr University shares an Advanced Composite Training and Development Centre, (ACT&DC) with Airbus at the Broughton site. A fully-equipped specialist composite laboratory will be used for lab tutorials throughout and also the student's dissertation project if required.

The University is perfectly placed with a number of composite manufacturers within 30 miles, namely Solvay, Sigmatex and Excel. In addition, there are a number of SME and large engineering companies that utilise composite materials for their designs and components. It is expected with sufficient marketing and relationship management that we will attract part time students from these institutions.

The composites specialism has been developed to allow students with different undergraduates qualifications (provided they are from STEM backgrounds) to study for the masters.

MSc Engineering (Renewable & Sustainable Energy)

To meet the 2050 carbon reduction targets to control climate change, member states of the EU have signed legally binding targets to transition from traditional fossil fuel energy sources to renewable and sustainable energies. This specialism offers a graduate a chance to access this exciting, dynamic and highly innovative field.

The programme provides an up-to-date overview of all the major renewable energy sources. This includes the engineering skills associated with selecting, designing and installing the apparatus to capture, as well as store, convert and transfer it into useful forms.

The programme also looks at the engineering aspects of clean energy, energy economics and markets. The cost/ benefit/ tariff/risk analysis of renewables is compared with traditional fossil fuel and nuclear energy sources. Socio-economic, energy security and political issues are addressed as well as environmental factors of different energy sources.

The future of renewable energy will rely on innovative forward thinking businesses, politicians, engineers and managers and as such this programme also encourages creativity and entrepreneurship to produce solutions to real world problems.

MSc Engineering (Electrical & Electronic)
The usage of electronic, automation and motor drive systems has grown immensely over the past few years in both industrial and domestic applications. This domination is based on recent advances in power electronics, electric motors and control engineering. It has been observed that almost half of the global electrical energy is consumed today by electric motors and automation systems.

Electrical and Electronic engineers are also involved with advanced industrial control systems, as well as telecoms, for mobile phone applications. There are also many roles for them in the energy industries, for example designing and running complex control systems such as those needed to run the National Grid or to control a nuclear power station.

To prepare students for these fast changing roles, the programme specialism covers design, modelling and test algorithms for complex electrical and electronic assemblies. Analysis of circuit design for both low and high frequencies is an important element of the course content.

Software development is an integral part of a modern Electronic Engineers role and to support this, software tools such as VEE, MULTISIM and MATLAB are used extensively in the course. Consideration of sustainability, compliance with RoHS directives and obsolescence solutions are also considered.

MSc Engineering (Mechatronics)
Mechatronics is a modern fusion of electrical and electronic, mechanical and software engineering.

The interface between electrical and mechanical environments is the role of a Mechatronics engineer. It combines precision engineering, automatic control and real-time computing to produce innovative products, such as smartphones, the manufacture of semiconductors, electron microscopes and medical equipment. Robotic manufacturing processes, automatic vision based and vehicle navigation systems also use Mechatronics principles.

There is increasing industry demand for graduates who can work in this interdisciplinary engineering environment. International companies such as Siemens,

Volkswagen, and Micron Semiconductors etc. all recruit graduates with a Mechatronics profile.

To develop Mechatronics graduate skills, the programme covers design and modelling of electromechanical systems such as positioning of robotic arms, pick and place technology using vision, recognition and feedback sensing.

The programme also includes real time control system modelling and embedded systems design, development and implementation. Programming includes both high and low level languages such as Python, C or C++, and VHDL for FPGA applications.

21 Programme structure narrative

The details relating to each of the routes are expanded later in this document, this section provides an overview of the structure only.

MSc Engineering:
MSc Engineering (Aeronautical)
MSc Engineering (Mechanical Manufacture)
MSc Engineering (Automotive)
MSc Engineering (Composite Materials)
MSc Engineering (Renewable & Sustainable Energy)
MSc Engineering (Electrical & Electronic)
MSc Engineering (Mechatronics)

The following exit awards are available to students who achieve the following;

- Post Graduate Diploma (PG Dip) requires the achievement of 120 credits taught at level 7.
- Post Graduate Certificate (PG Cert) requires the achievement of any combination of taught modules amounting to 60 credits across any routes. Students who enrol specifically for PG Cert, will be notified of the available modules prior to enrolment, depending on the available routes with viable student numbers.

Part one of the programme consists of three 60-credit common taught modules and three 60-credit specialist modules.

The following tables indicate the modules for each route and the indicative delivery structure. The individual programme structure diagrams in section 22 indicate optional module choices available for the following programme routes MSc Engineering (Aeronautical), MSc Engineering (Automotive), MSc Engineering (Mechanical Manufacturing) and MSc Engineering (Renewable & Sustainable Energy)

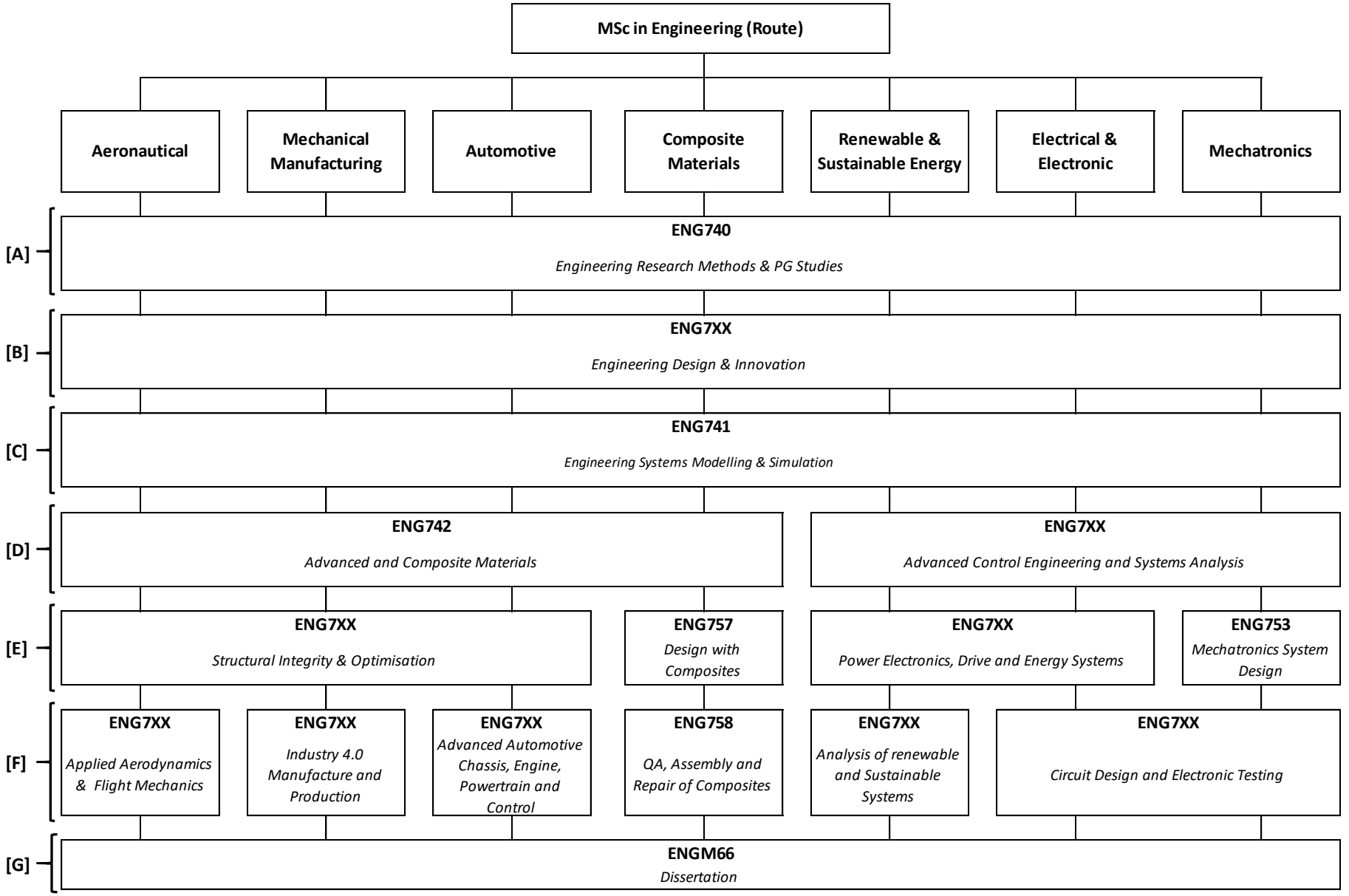

Table 1: MSc Engineering programme structure for individual routes, A to C is common modules & D to F is specialist modules for the selected route. (*The coding A to G is there to illustrate the delivery pattern in Table 2*)

Delivery:

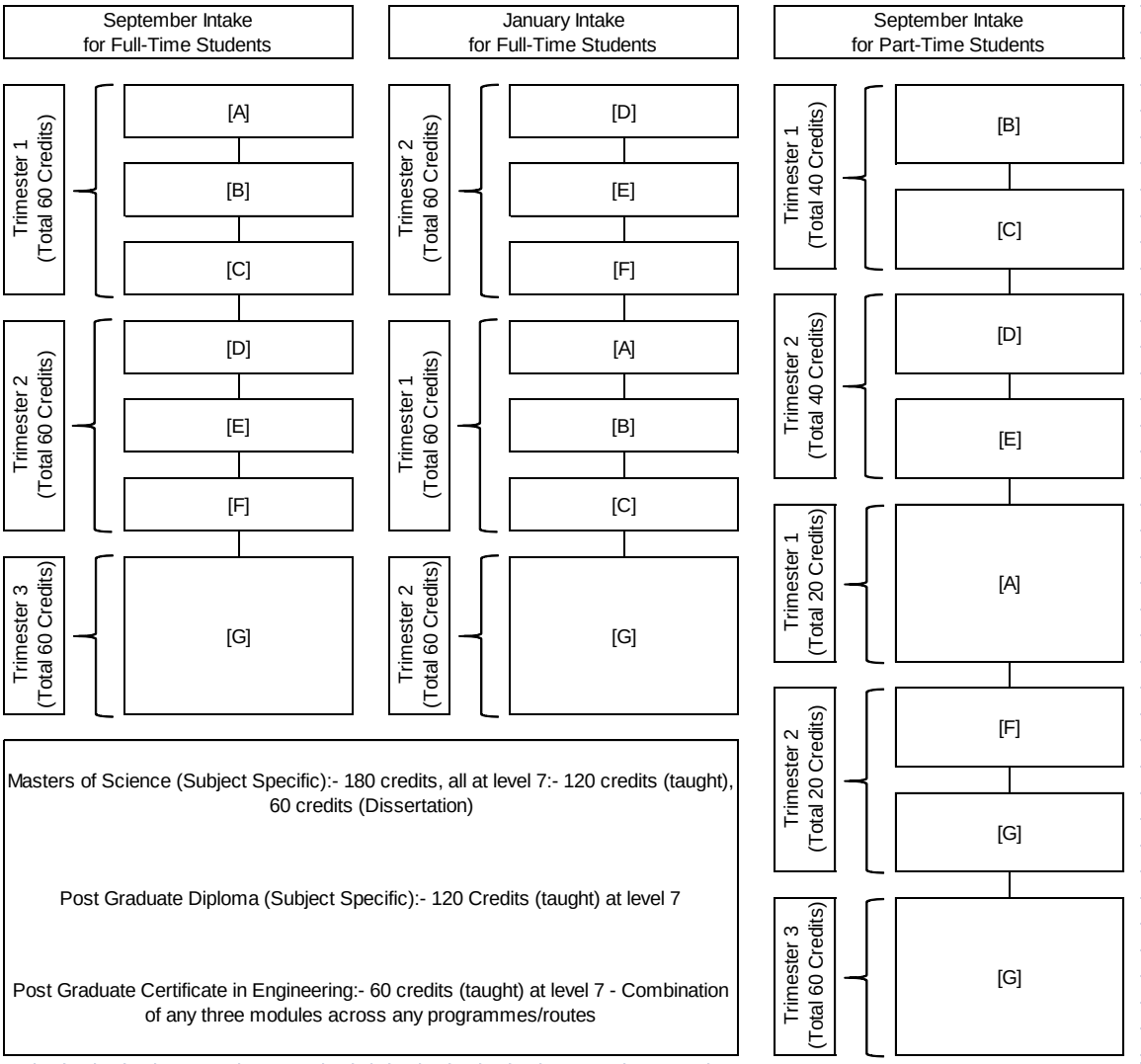

Table 2: MSc programme delivery pattern for the following intakes; full-time September, full-time January and part-time September. (*Modules indicated with letters from A to G can be found from Table 1*)

Every module is level seven and each taught module is 20 credits; the dissertation module is 60 credits, thus the sum of each column in Table 1 amounts to 180 credits – required for the MSc qualification.

The exit points are PG dip and PG Cert:

Post Graduate Diploma (PG dip) requires the achievement of 120 credits taught at level 7

Full-time Mode (September Intake)

The taught element, Part One, of the programme will be delivered in two 12 week trimesters and each trimester has a loading of 60 credits. The six taught modules will have lectures and tutorials/practical work on a weekly basis. The module duration will be a total of 200 hours, which includes 40 hours of scheduled learning and teaching hours and 160 independent study hours. Part Two will then take a further 15 weeks having a notional study time of 600 hours. During this time the student will be responsible for managing his/her time in consultation with an academic supervisor.

Full-time Mode (January Intake)

For the January intake, students will study three specialist modules first during the second trimester from January to May. Other three common modules the students will study in the first trimester of the next academic year from September to January. On successful completion of the taught element of the programme the students will be progressed to the Part Two, MSc dissertation to be submitted in April/May.

Part-time Mode

The taught element, part one, of the programme will be delivered in two academic teaching years. 80 credits or equivalent worth of modules will be delivered in the first year and 40 credits or equivalent in the second year. The part time students would join the full time delivery with lectures and tutorials/practical work during one day on a weekly basis. The dissertation element (i.e. Part Two) will start in trimester 2 taking a further 30 weeks having a total notional study time of 600 hours. During this time the student will be responsible for managing his/her time in consultation with an academic supervisor.

Semester 3 Summer Intake

For semester 3 intake the duration of the study of the provision will be from July to July of following year, where period of study of taught component is 5 months (July– November) and the period of study at dissertation stage is 8 months (December – July). The taught component will be divided into routes according to the MSc programme titles.

The taught component of each route consists of six 20-credit modules. Each module includes 40 contact hours and 160 hours of self-study. Each route constitutes three 20-credit common taught modules and three 20-credit specialist modules. The students will be allocated into cohorts to study the modules from the selected engineering programme route. The taught element (contact hours) will be delivered over 8 weeks using summer block delivery mode. The self-study element will be spread over 4 month period of study.

MSc dissertation (60 credits) will take place over two semesters (semester 1 and semester 2) from December to July. It takes a further 30 weeks having a notional study time of 600 hours. The students will work on the dissertation off site under remote Glyndwr University staff supervision. During this time the student will be responsible for managing his/her time in consultation with an academic supervisor. In the end of the semester 2, the students have to attend the University at their own cost for the dissertation presentation. Allocation of two semesters for the dissertation is in the line of the existing Part-Time delivery mode.

Students who have studied an undergraduate programme and wish to apply to the masters programme will be able to enrol following awards board confirmation of UG results in July. Results for taught stage modules will be considered at the January / February assessment boards where students will be progressed to the dissertation stage as appropriate. Students will be able to informally commence the dissertation module prior to receiving their confirmed results. Students will undertake the presentation element of assessment for their dissertation in June and results will be considered at the September awards board.

In the event of a student being referred in any taught modules, the expectation would be that they undertake resits in Feb-May and results would be considered at the standard engineering board in June and to be consistent dissertation marks would be considered at the Jan/Feb Board.

Example: MSc Engineering (Mechanical Manufacturing) route for MSc Semester 3 Summer Delivery			
(Common Modules)			
July	**ENG740** *Engineering Research Methods & PG Studies*	**ENG765** *Engineering Design & Innovation*	**ENG741** *Engineering Systems Modelling & Simulation*
Mechanical Manufacturing route *(Specialist Modules)*			
August	**ENG742** *Advanced & Composite Materials*	**ENG766** *Structural Integrity & Optimisation*	**ENG769** *Industry 4.0 Manufacture and Production*
September - November	*Self-Learning and Work on Assessments*		
December - July	**ENGM66** *Dissertation*		

Figure 1 – *Example of MSc Engineering (Mechanical Manufacturing) summer delivery*

The indicative timetables given below reflect the allocation of contact hours of the modules during 8 weeks block delivery study. Each 20 credit module includes 40 contact hours; therefore, six modules constitutes 240 contact hours. Additional support in the form of drop in sessions on Fridays will be provided for ENG741 Engineering Systems Modelling & Simulation.

	09:00	*09:30*	*10:00*	*10:30*	*11:00*	*11:30*	*12:00*	*12:30*	*13:00*	*13:30*	*14:00*	*14:30*	*15:00*	*15:30*	*16:00*	*16:30*	*17:00*	*17:30*
Mon	**ENG7XX** *Engineering Design & Innovation*										**ENG741** *Engineering Systems Modelling & Simulation*							
Tue	**ENG740** *Engineering Research Methods & PG Studies*										**ENG740** *Engineering Research Methods & PG Studies*				**ENG7XX** *Engineering Design & Innovation*			
Wed	**ENG740** *Engineering Research Methods & PG Studies*										**ENG741** *Engineering Systems Modelling & Simulation*							
Thu	**ENG765** *Engineering Design & Innovation*										**ENG741** *Engineering Systems Modelling & Simulation*							
Fri	*Open Sessions / Drop in Sessions / Library Accesses / Laboratory Access / Assessment Work*																	

Figure 2 - Indicative Timetable for Common Modules (*June*)

	09:00	*09:30*	*10:00*	*10:30*	*11:00*	*11:30*	*12:00*	*12:30*	*13:00*	*13:30*	*14:00*	*14:30*	*15:00*	*15:30*	*16:00*	*16:30*	*17:00*	*17:30*
Mon	**ENG742** *Advanced & Composite Materials*										**ENG766** *Structural Integrity & Optimisation*							
Tue	**ENG769** *Industry 4.0 Manufacture and Production*										**ENG742** *Advanced & Composite Materials*							
Wed	**ENG769** *Industry 4.0 Manufacture and Production*										**ENG766** *Structural Integrity & Optimisation*							

Thu	**ENG742** *Advanced & Composite Materials*	**ENG769** *Industry 4.0 Manufacture and Production*			**ENG766** *Structural Integrity & Optimisation*				
Fri	*Open Sessions / Drop in Sessions / Library Accesses / Laboratory Access / Assessment Work*								

Figure 3 - Indicative Timetable for Specialist Modules (*July) (Mechanical Manufacturing route)*

22 Programme structure diagram

MSc Engineering (Aeronautical)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Engineering Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG765	Mod code	ENG741
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	S. Monir	Mod leader	D. Sprake	Mod leader	S. Monir

Semester 2	Mod title	Advanced & Composite Materials	Advanced Control Engineering and System Analysis	Mod title	Structural Integrity & Optimisation	Mod title	Applied Aerodynamics & Flight Mechanics
	Mod code	ENG742	ENG773	Mod code	ENG766	Mod code	ENG768
	Credit value	20	20	Credit value	20	Credit value	20
	Core/Option	Optional	Optional	Core/Option	Core	Core/Option	Core
	Mod leader	R. Day	Zheng Chen	Mod leader	M. Jones	Mod leader	N. Burdon

Semester 3	Mod title	Dissertation
	Mod code	ENGM66
	Credit value	60
	Core/Option	Core
	Mod leader	S. Monir

MSc Engineering (Mechanical Manufacturing)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Engineering Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG765	Mod code	ENG741
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	S. Monir	Mod leader	D. Sprake	Mod leader	S. Monir

Semester 2	Mod title	Advanced & Composite Materials	Advanced Control Engineering and System Analysis	Mod title	Structural Integrity & Optimisation	Mod title	Industry 4.0 Manufacture and Production
	Mod code	ENG742	ENG773	Mod code	ENG766	Mod code	ENG769
	Credit value	20	20	Credit value	20	Credit value	20
	Core/Option	Optional	Optional	Core/Option	Core	Core/Option	Core
	Mod leader	R. Day	Zheng Chen	Mod leader	M. Jones	Mod leader	M. Jones

Semester 3	Mod title	Dissertation
	Mod code	ENGM66
	Credit value	60
	Core/Option	Core
	Mod leader	S. Monir

MSc Engineering (Automotive)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Engineering Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG765	Mod code	ENG741
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	S. Monir	Mod leader	D. Sprake	Mod leader	S. Monir

Semester 2	Mod title	Advanced & Composite Materials	Advanced Control Engineering and System Analysis	Mod title	Structural Integrity & Optimisation	Mod title	Advanced Automotive Chassis, Engine, Powertrain and Control
	Mod code	ENG742	ENG773	Mod code	ENG766	Mod code	ENG767
	Credit value	20	20	Credit value	20	Credit value	20
	Core/Option	Optional	Optional	Core/Option	Core	Core/Option	Core
	Mod leader	R. Day	Zheng Chen	Mod leader	M. Jones	Mod leader	O. Durieux

Semester 3	Mod title	Dissertation
	Mod code	ENGM66
	Credit value	60
	Core/Option	Core
	Mod leader	S. Monir

MSc Engineering (Composite materials)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Engineering Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG765	Mod code	ENG741
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	S. Monir	Mod leader	D. Sprake	Mod leader	S. Monir

Semester 2	Mod title	Advanced & Composite Materials	Mod title	Design With Composites	Mod title	QA, Assembly and Repair of Composites
	Mod code	ENG742	Mod code	ENG757	Mod code	ENG758
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	R. Day	Mod leader	M. Jones	Mod leader	M. Jones

Semester 3	Mod title	Dissertation
	Mod code	ENGM66
	Credit value	60
	Core/Option	Core
	Mod leader	S. Monir

MSc Engineering (Renewable & Sustainable Energy)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Engineering Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG765	Mod code	ENG741
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	S. Monir	Mod leader	D. Sprake	Mod leader	S. Monir

Semester 2	Mod title	Advanced Control Engineering and System Analysis	Advanced & Composite Materials	Mod title	Power Electronics, Drives and Energy Systems	Mod title	Analysis of Renewable and Sustainable Systems
	Mod code	ENG773	ENG742	Mod code	ENG775	Mod code	ENG736
	Credit value	20	20	Credit value	20	Credit value	20
	Core/Option	Optional	Optional	Core/Option	Core	Core/Option	Core
	Mod leader	Zheng Chen	R. Day	Mod leader	Y. Vagapov	Mod leader	D. Sprake

Semester 3	Mod title	Dissertation
	Mod code	ENGM66
	Credit value	60
	Core/Option	Core
	Mod leader	S. Monir

MSc Engineering (Electrical & Electronic)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Engineering Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG765	Mod code	ENG741
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	S. Monir	Mod leader	D. Sprake	Mod leader	S. Monir

Semester 2	Mod title	Advanced Control Engineering and Systems Analysis	Mod title	Power Electronics, Drives and Energy Systems	Mod title	Circuit Design and Electronic Testing
	Mod code	ENG773	Mod code	ENG775	Mod code	ENG774
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Z. Chen	Mod leader	Y. Vagapov	Mod leader	A. Sharp

Semester 3	Mod title	Dissertation
	Mod code	ENGM66
	Credit value	60
	Core/Option	Core
	Mod leader	S. Monir

MSc Engineering (Mechatronics)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Engineering Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG765	Mod code	ENG741
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	S. Monir	Mod leader	D. Sprake	Mod leader	S. Monir

Semester 2	Mod title	Advanced Control Engineering and Systems Analysis	Mod title	Mechatronics System Design	Mod title	Circuit Design and Electronic Testing
	Mod code	ENG773	Mod code	ENG770	Mod code	ENG774
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Z. Chen	Mod leader	B. Klaveness	Mod leader	A. Sharp

Semester 3	Mod title	Dissertation
	Mod code	ENGM66
	Credit value	60
	Core/Option	Core
	Mod leader	S. Monir

23 Intended learning outcomes of the programme

Learning outcomes common to all programme routes covered by this document

	Knowledge and understanding		
	Post Graduate Certificate	Post Graduate Diploma	Masters
A1	*The Learning Outcomes for the intended PG Cert in Engineering will be determined by the chosen modules*	Understand complex mathematical principles relevant to advanced concepts.	Understand complex mathematical principles relevant to advanced concepts.
A2		Apply theoretical principles and application techniques.	Apply theoretical principles and application techniques.
A3		Practise the range of methodologies and computer tools available for analysis and design.	Practise the range of methodologies and computer tools available for analysis and design.
A4		Explore current problems, being treated in a critical and evaluative manner;	Explore current problems, being treated in a critical and evaluative manner;

	Intellectual skills		
	Post Graduate Certificate	Post Graduate Diploma	Masters
B1	*The Learning Outcomes for the intended PG Cert in Engineering will be determined by the chosen modules*	Apply advanced engineering principles to the solution of design and operation problems and the investigation of new and emerging technologies.	Apply advanced engineering principles to the solution of design and operation problems and the investigation of new and emerging technologies.
B2		Make sound decisions in complex and unpredictable situations, both familiar and unfamiliar.	Make sound decisions in complex and unpredictable situations, both familiar and unfamiliar.
B3		Analyse complex engineering issues in both a systematic and a creative way.	Analyse complex engineering issues in both a systematic and a creative way.
B4		Evaluate data sources and make sound judgements in the absence of complete data.	Evaluate data sources and make sound judgements in the absence of complete data.
B5			Plan, conduct and report on an original programme of work (dissertation)
B6			Apply planning and management techniques, with an evaluation of commercial financial

			implications, in the conduct and management of an engineering project;

Subject skills			
	Post Graduate Certificate	Post Graduate Diploma	Masters
C1	*The Learning Outcomes for the intended PG Cert in Engineering will be determined by the chosen modules*	Demonstrate self-direction and originality in tackling and solving systems problems.	Demonstrate self-direction and originality in tackling and solving systems problems.
C2		Plan and implement experimental design and evaluative testing.	Plan and implement experimental design and evaluative testing.
C3		Specify and use laboratory and workshop equipment competently and safely.	Specify and use laboratory and workshop equipment competently and safely.
C4			Prepare in-depth reports at a professional level.

Practical, professional and employability skills			
	Post Graduate Certificate	Post Graduate Diploma	Masters
D1	*The Learning Outcomes for the intended PG Cert in Engineering will be determined by the chosen modules*	Exercise initiative and personal responsibility.	Exercise initiative and personal responsibility.
D2		Communicate clearly to specialist and non-specialist audiences.	Communicate clearly to specialist and non-specialist audiences.
D3		Select and apply mathematical methodologies in the interpretation of problems and evaluation of solutions.	Select and apply mathematical methodologies in the interpretation of problems and evaluation of solutions.
D4		Exercise judgement in the use of information technology - to source information and to model performance using specialised software packages, with awareness of the limitations computer models.	Exercise judgement in the use of information technology - to source information and to model performance using specialised software packages, with awareness of the limitations computer models.
D5		Apply the independent learning ability required for continuing professional development;	Apply the independent learning ability required for continuing professional development.
D6			Exercise autonomy and self-direction regarding own performance and self-management.

In addition to the common Learning Outcomes listed above, the following Learning Outcomes are specific to MSc Engineering (Aeronautical)

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Understand in depth knowledge relating to the different types of composites used along with production methods and their advantages and disadvantages compared to traditional engineering materials.	Understand in depth knowledge relating to the different types of composites used along with production methods and their advantages and disadvantages compared to traditional engineering materials.
A6		Understand in depth knowledge of failure mechanisms in static structures, with critical awareness of temporal failures of materials. Critically understand fracture and crack propagation in metals and demonstrate their understanding of material degrade and structural strength effects.	Understand in depth knowledge of failure mechanisms in static structures, with critical awareness of temporal failures of materials. Critically understand fracture and crack propagation in metals and demonstrate their understanding of material degrade and structural strength effects.
A7		Predict characteristics associated with airflow over aircraft or sections of airframe, such as fuselage contouring and problems, such as shock wave boundary layer interactions, along with mathematical analysis and wind tunnel testing.	Predict characteristics associated with airflow over aircraft or sections of airframe, such as fuselage contouring and problems, such as shock wave boundary layer interactions, along with mathematical analysis and wind tunnel testing.
A8		Apply fundamental concepts related to the longitudinal and lateral stability control of aircraft, including the effects of the control surfaces and the reaction of the aircraft.	Apply fundamental concepts related to the longitudinal and lateral stability control of aircraft, including the effects of the control surfaces and the reaction of the aircraft.
A9			Present an in depth understanding for the role of an engineer manager for himself/herself and of others;
A10			Conduct research in recent engineering developments and the context within which engineering is applied;

In addition to the common Learning Outcomes listed above, the following Learning Outcomes are specific to MSc Engineering (Mechanical Manufacturing)

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Understand in depth knowledge relating to the different types of composites used along with production methods and their advantages and disadvantages compared to traditional engineering materials.	Understand in depth knowledge relating to the different types of composites used along with production methods and their advantages and disadvantages compared to traditional engineering materials.
A6		Understand in depth knowledge of failure mechanisms in static structures, with critical awareness of temporal failures of materials. Critically understand fracture and crack propagation in metals and demonstrate their understanding of material degrade and structural strength effects.	Understand in depth knowledge of failure mechanisms in static structures, with critical awareness of temporal failures of materials. Critically understand fracture and crack propagation in metals and demonstrate their understanding of material degrade and structural strength effects.
A7		Evaluate in depth knowledge of the infrastructure and technologies necessary to improve manufacturing processes with regards to industry 4.0.	Evaluate in depth knowledge of the infrastructure and technologies necessary to improve manufacturing processes with regards to industry 4.0.
A8		Verify and enhance engineering practices, products, systems, services and develop analysis of production methods.	Verify and enhance engineering practices, products, systems, services and develop analysis of production methods.
A9			Present an in depth understanding for the role of an engineer manager for himself/herself and of others;
A10			Conduct research in recent engineering developments and the context within which engineering is applied;

In addition to the common Learning Outcomes listed above, the following Learning Outcomes are specific to MSc Engineering (Automotive)

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Understand in depth knowledge relating to the different types of composites used along with production methods and their advantages and disadvantages compared to traditional engineering materials.	Understand in depth knowledge relating to the different types of composites used along with production methods and their advantages and disadvantages compared to traditional engineering materials.
A6		Understand in depth knowledge of failure mechanisms in static structures, with critical awareness of temporal failures of materials. Critically understand fracture and crack propagation in metals and demonstrate their understanding of material degrade and structural strength effects.	Understand in depth knowledge of failure mechanisms in static structures, with critical awareness of temporal failures of materials. Critically understand fracture and crack propagation in metals and demonstrate their understanding of material degrade and structural strength effects.
A7		Understand in depth knowledge of engine thermodynamics, with emphasis on optimisation of modern powertrains.	Understand in depth knowledge of engine thermodynamics, with emphasis on optimisation of modern powertrains.
A8		Evaluate in depth knowledge in automotive chassis engineering, with emphasis on the factors that influence stability, comfort and efficiency of vehicles	Evaluate in depth knowledge in automotive chassis engineering, with emphasis on the factors that influence stability, comfort and efficiency of vehicles
A9			Present an in depth understanding for the role of an engineer manager for himself/herself and of others;
A10			Conduct research in recent engineering developments and the context within which engineering is applied;

In addition to the common Learning Outcomes listed above, the following Learning Outcomes are specific to MSc Engineering (Composite Materials)

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Understand in depth knowledge relating to the different types of composites used along with production methods and their advantages and disadvantages compared to traditional engineering materials.	Understand in depth knowledge relating to the different types of composites used along with production methods and their advantages and disadvantages compared to traditional engineering materials.
A6		Understand in depth knowledge of detailed mechanics of composites and classical laminate theory. Furthermore evaluate potential issues affecting composite structures, with developments of computational methods aiding the design process	Understand in depth knowledge of detailed mechanics of composites and classical laminate theory. Furthermore evaluate potential issues affecting composite structures, with developments of computational methods aiding the design process
A7		Critically evaluate mechanical characterisation of composite materials for testing standards. Furthermore, understand in depth knowledge of impact and crash worthiness of composites	Critically evaluate mechanical characterisation of composite materials for testing standards. Furthermore, understand in depth knowledge of impact and crash worthiness of composites
A8		Understand and analyse the methods for no-destructive characterisation and limitations for composites, with further understanding of composite repair and assembly.	Understand and analyse the methods for no-destructive characterisation and limitations for composites, with further understanding of composite repair and assembly.
A9			Present an in depth understanding for the role of an engineer manager for himself/herself and of others;
A10			Conduct research in recent engineering developments and the context within which engineering is applied;

In addition to the common Learning Outcomes listed above, the following Learning Outcomes are specific to MSc Engineering (Renewable & Sustainable Energy)

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Analyse and model complex control systems in order to manipulate the desired process outcomes and ensure that all reasonable disturbances have been accounted for thereby developing a stable system.	Analyse and model complex control systems in order to manipulate the desired process outcomes and ensure that all reasonable disturbances have been accounted for thereby developing a stable system.
A6		Understand in-depth knowledge of electrical power systems including generation, transmission and distribution. Critical evaluate electric drive control strategies with emphasis on electronics drive as a complex structure.	Understand in-depth knowledge of electrical power systems including generation, transmission and distribution. Critical evaluate electric drive control strategies with emphasis on electronics drive as a complex structure.
A7		Perform analysis and evaluate the design and operation of power-system plant, transmission networks, and smart low-carbon distribution networks	Perform analysis and evaluate the design and operation of power-system plant, transmission networks, and smart low-carbon distribution networks
A8		Apply detailed knowledge of renewable energy sources sufficient to make informed judgments relating to the economic viability of the different systems and associated circumstances.	Apply detailed knowledge of renewable energy sources sufficient to make informed judgments relating to the economic viability of the different systems and associated circumstances.
A9			Present an in depth understanding for the role of an engineer manager for himself/herself and of others;
A10			Conduct research in recent engineering developments and the context within which engineering is applied;

In addition to the common Learning Outcomes listed above, the following Learning Outcomes are specific to MSc Engineering (Electrical & Electronic)

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Analyse and model complex control systems in order to manipulate the desired process outcomes and ensure that all reasonable disturbances have been accounted for thereby developing a stable system.	Analyse and model complex control systems in order to manipulate the desired process outcomes and ensure that all reasonable disturbances have been accounted for thereby developing a stable system.
A6		Understand in-depth knowledge of electrical power systems including generation, transmission and distribution. Critical evaluate electric drive control strategies with emphasis on electronics drive as a complex structure.	Understand in-depth knowledge of electrical power systems including generation, transmission and distribution. Critical evaluate electric drive control strategies with emphasis on electronics drive as a complex structure.
A7		Perform analysis and evaluate the design and operation of power-system plant, transmission networks, and smart low-carbon distribution networks	Perform analysis and evaluate the design and operation of power-system plant, transmission networks, and smart low-carbon distribution networks
A8		Develop a critical understanding of electronic circuit design and be able to predict performance based upon analysis and simulation techniques.	Develop a critical understanding of electronic circuit design and be able to predict performance based upon analysis and simulation techniques.
A9			Present an in depth understanding for the role of an engineer manager for himself/herself and of others;
A10			Conduct research in recent engineering developments and the context within which engineering is applied;

In addition to the common Learning Outcomes listed above, the following Learning Outcomes are specific to MSc Engineering (Mechatronics)

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Analyse and model complex control systems in order to manipulate the desired process outcomes and ensure that all reasonable disturbances have been accounted for thereby developing a stable system.	Analyse and model complex control systems in order to manipulate the desired process outcomes and ensure that all reasonable disturbances have been accounted for thereby developing a stable system.
A6		In depth knowledge of mechanical/ electrical control in applications of mechatronics and industrial engineering, with critical evaluation of mechatronic systems meeting industrial specifications	In depth knowledge of mechanical/ electrical control in applications of mechatronics and industrial engineering, with critical evaluation of mechatronic systems meeting industrial specifications
A7		Develop synergistic combinations of precision engineering, electronic control and mechanical systems	Develop synergistic combinations of precision engineering, electronic control and mechanical systems
A8		Develop a critical understanding of electronic circuit design and be able to predict performance based upon analysis and simulation techniques.	Develop a critical understanding of electronic circuit design and be able to predict performance based upon analysis and simulation techniques.
A9			Present an in depth understanding for the role of an engineer manager for himself/herself and of others;
A10			Conduct research in recent engineering developments and the context within which engineering is applied;

24 Curriculum matrix

MSc Engineering (Aeronautical)

	Module Title	Core or option ?	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6
Level 7	*Engineering Research Methods & PG Studies*	Core	■	■	□	■	□	□	□	□	■	■	□	■	□	■	□	□	■	■	■	□	■	□	■	■	□	■
	Engineering Design & Innovation	Core	□	■	□	■	□	□	□	□	■	■	■	□	□	■	□	■	■	■	■	□	■	□	□	□	□	□
	Engineering Systems Modelling & Simulations	Core	■	■	■	■	□	□	□	□	□	■	■	□	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Advanced & Composite Materials	Core	■	■	■	■	■	□	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Structural Integrity & Optimisation	Core	■	■	■	■	□	■	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Applied Aerodynamics & Flight Mechanics	Core	■	■	■	■	□	□	■	■	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Dissertation	Core	■	■	■	■	□	□	□	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

MSc Engineering (Mechanical Manufacture)

	Module Title	Core or option ?	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6
Level 7	*Engineering Research Methods & PG Studies*	Core	■	■	□	■	□	□	□	□	■	■	□	■	□	■	□	□	■	■	■	□	■	□	■	■	□	■
	Engineering Design & Innovation	Core	□	■	□	■	□	□	□	□	■	■	■	□	□	■	□	■	■	■	■	□	■	□	□	□	□	□
	Engineering Systems Modelling & Simulations	Core	■	■	■	■	□	□	□	□	□	■	■	□	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Advanced & Composite Materials	Core	■	■	■	■	■	□	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Structural Integrity & Optimisation	Core	■	■	■	■	□	■	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Industry 4.0 Manufacture and Production	Core	■	■	■	■	□	□	■	■	□	■	■	■	■	■	□	■	■	■	■	■	□	■	■	■	□	□
	Dissertation	Core	■	■	■	■	□	□	□	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

MSc Engineering (Automotive)

	Module Title	Core or option ?	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6
Level 7	*Engineering Research Methods & PG Studies*	Core	■	■	□	■	□	□	□	□	■	■	□	■	□	■	□	□	■	■	■	□	■	□	■	■	□	■
	Engineering Design & Innovation	Core	□	■	□	■	□	□	□	□	■	■	■	□	□	■	□	■	■	■	■	□	■	□	□	□	□	□
	Engineering Systems Modelling & Simulations	Core	■	■	■	■	□	□	□	□	□	■	■	□	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Advanced & Composite Materials	Core	■	■	■	■	■	□	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Structural Integrity & Optimisation	Core	■	■	■	■	□	■	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Advanced Automotive Chassis, Engine, Powertrain and Control	Core	■	■	■	■	□	□	■	■	□	■	■	■	■	■	□	■	■	■	■	■	□	■	■	■	□	□
	Dissertation	Core	■	■	■	■	□	□	□	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

MSc Engineering (Composite Materials)

	Module Title	Core or option ?	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6
Level 7	*Engineering Research Methods & PG Studies*	Core	■	■	□	■	□	□	□	□	■	■	□	■	□	■	□	□	■	■	■	□	■	□	■	■	□	■
	Engineering Design & Innovation	Core	□	■	□	■	□	□	□	□	■	■	■	□	□	■	□	■	■	■	■	□	■	□	□	□	□	□
	Engineering Systems Modelling & Simulations	Core	■	■	■	■	□	□	□	□	□	■	■	□	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Advanced & Composite Materials	Core	■	■	■	■	■	□	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Design with Composites	Core	■	■	■	■	□	■	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	QA, Assembly and Repair of Composites	Core	■	■	■	■	□	□	■	■	□	■	■	■	■	■	□	■	■	■	■	■	□	■	■	■	□	□
	Dissertation	Core	■	■	■	■	□	□	□	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

MSc Engineering (Renewable & Sustainable Energy)

	Module Title	Core or option ?	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6
Level 7	*Engineering Research Methods & PG Studies*	Core	■	■	□	■	□	□	□	□	■	■	□	■	□	■	□	□	■	■	■	□	■	□	■	■	□	■
	Engineering Design & Innovation	Core	□	■	□	■	□	□	□	□	■	■	■	□	□	■	□	■	■	■	■	□	■	□	□	□	□	□
	Engineering Systems Modelling & Simulations	Core	■	■	■	■	□	□	□	□	□	■	■	□	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Advanced Control Engineering and Systems Analysis	Core	■	■	■	■	■	□	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Power Electronics, Drives and Energy Systems	Core	■	■	■	■	□	■	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Analysis of renewable and Sustainable Systems	Core	■	■	■	■	□	□	■	■	■	■	■	■	■	■	□	■	■	■	■	■	□	■	■	■	□	□
	Dissertation	Core	■	■	■	■	□	□	□	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

MSc Engineering (Electrical & Electronic)

	Module Title	Core or option ?	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6
Level 7	Engineering Research Methods & PG Studies	Core	■	■	□	■	□	□	□	□	■	■	□	■	□	■	□	□	■	■	■	□	■	□	■	■	□	■
	Engineering Design & Innovation	Core	□	■	□	■	□	□	□	□	■	■	■	□	□	■	□	■	■	■	■	□	■	□	□	□	□	□
	Engineering Systems Modelling & Simulations	Core	■	■	■	■	□	□	□	□	□	■	■	□	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Advanced Control Engineering and Systems Analysis	Core	■	■	■	■	■	□	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Power Electronics, Drives and Energy Systems	Core	■	■	■	■	□	■	□	□	□	■	■	■	■	■	□	■	■	■	■	■	□	■	■	■	□	□
	Circuit Design and Electronic Testing	Core	■	■	■	■	□	□	■	■	□	■	■	■	■	■	□	■	■	■	■	■	□	■	■	■	□	□
	Dissertation	Core	■	■	■	■	□	□	□	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

MSc Engineering (Mechatronics)

	Module Title	Core or option ?	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6
Level 7	*Engineering Research Methods & PG Studies*	Core	■	■	□	■	□	□	□	□	■	■	□	■	□	■	□	□	■	■	■	□	■	□	■	■	□	■
	Engineering Design & Innovation	Core	□	■	□	■	□	□	□	□	■	■	■	□	□	■	□	■	■	■	■	□	■	□	□	□	□	□
	Engineering Systems Modelling & Simulations	Core	■	■	■	■	□	□	□	□	□	■	■	□	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Advanced Control Engineering and Systems Analysis	Core	■	■	■	■	■	□	□	□	□	■	■	■	■	■	□	□	■	■	■	■	□	■	■	■	□	□
	Mechatronics System Design	Core	■	■	■	■	□	■	□	□	□	■	■	■	■	■	□	■	■	■	■	■	□	■	■	■	□	□
	Circuit Design and Electronic Testing	Core	■	■	■	■	□	□	■	■	□	■	■	■	■	■	□	■	■	■	■	■	□	■	■	■	□	□
	Dissertation	Core	■	■	■	■	□	□	□	□	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

MSc Engineering programmes - summary of Accreditation of Higher Education Programmes learning outcomes by module

MSc in Engineering: MSc in Engineering (Aeronautical) MSc in Engineering (Mechanical Manufacturing) MSc in Engineering (Automotive) MSc in Engineering (Composite Materials) MSc in Engineering (Renewable & Sustainable Energy) MSc in Engineering (Electrical & Electronic) MSc in Engineering (Mechatronics) MSc Unmanned Aircraft Systems Technology		ENG740 Engineering Research Methods & PG Studies	ENG7XX Engineering Design & Innovation	ENG741 Engineering Systems Modelling & Simulation	ENGM66 Dissertation	ENG742 Advanced & Composite Materials	ENG7XX Advanced Control Engineering and Systems Analysis	ENG7XX Structural Integrity & Operations	ENG7XX Power Electronics, Drive and Energy Systems	ENG7XX Circuit Design and Electronic Testing	ENG7XX Applied Aerodynamics & Flight Mechanics	ENG7XX Industry 4.0 Manufacture and Production	ENG7XX Advanced Automotive Chassis, Engine, Powertrain and Control	ENG757 Design with Composites	ENG758 Assembly and Repair of Composites	ENG7XX Analysis of Renewable and Sustainable Systems	ENG753 Mechatronics System Design
Science and Mathematics (SM)																	
SM7M	A comprehensive understanding of the relevant scientific principles of the specialisation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	
SM8M	A critical awareness of current problems and/or new insights most of which is at, or informed by, the forefront of the specialisation	✓	✓	□	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SM9M	Understanding of concepts relevant to the discipline, some from outside engineering, and the ability to evaluate them critically and to apply them effectively, including in engineering projects	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Engineering Analysis (EA)																	
EA6M	Ability both to apply appropriate engineering analysis methods for solving complex problems in engineering and to assess their limitations	✓	□	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

EA5m	Ability to use fundamental knowledge to investigate new and emerging technologies	✓	✓	□	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓
EA7M	Ability to collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate innovation, use or adaptation of engineering analytical methods	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Design (D)																	
D9M	Knowledge, understanding and skills to work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies	✓	□	✓	✓			✓	✓					✓			✓
D10M	Knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓			✓
D11M	Ability to generate an innovative design for products, systems, components or processes to fulfil new needs	✓	✓		✓			✓	✓	✓	✓	✓	✓	✓		✓	✓
Economic, legal, social, ethical and environmental context (EL)																	
EL8M	Awareness of the need for a high level of professional and ethical conduct in engineering	✓	✓		✓	✓					✓			✓	✓	✓	
EL9M	Awareness that engineers need to take account of the commercial and social contexts in which they operate	✓	✓		✓	□					✓					✓	
EL10M	Knowledge and understanding of management and business practices, their limitations, and how these may be applied	✓	✓		✓							✓				✓	

	in the context of the particular specialisation															
EL11M	Awareness that engineering activities should promote sustainable development and ability to apply quantitative techniques where appropriate	✓	✓		✓					✓					✓	
EL12M	Awareness of relevant regulatory requirements governing engineering activities in the context of the particular specialisation	✓	✓		✓					✓	✓				✓	
EL13M	Awareness of and ability to make general evaluations of risk issues in the context of the particular specialisation, including health & safety, environmental and commercial risk	✓	✓		✓	✓		✓	✓		✓	✓	✓	✓	✓	✓
Engineering Practice (P)																
P12M	Advanced level knowledge and understanding of a wide range of engineering materials and components	□		✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓
P9m	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P10m	Ability to apply engineering techniques, taking account of a range of commercial and industrial constraints	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
P11m	Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader	✓	✓		✓												
Additional general skills (G)																
G1	Apply their skills in problem solving, communication, information retrieval,	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	working with others, and the effective use of general IT facilities																
G2	Plan self-learning and improve performance, as the foundation for lifelong learning/CPD	✓	✓		✓			□									
G3m	Monitor and adjust a personal programme of work on an on-going basis	✓	✓		✓			□									
G4	Exercise initiative and personal responsibility, which may be as a team member or leader	✓	✓		✓												

25 Learning and teaching strategy

The learning and teaching strategy has been developed within Glyndŵr University's Teaching and Learning Framework, the QAA Subject Benchmark statement for Engineering (2015) and the QCA (Qualifications and Curriculum Authority). Although the benchmark statement applies to undergraduate programmes it was also referred to and built on in the development of these post graduate programmes.

The team recognises that the learning and teaching strategy should reflect the different requirements of the students. In order to achieve this the team have agreed the following strategy:

1. To ensure that the teaching methods adopted for classroom and related activity are planned to ensure that tutors use a range of examples, reflecting the diversity of experiences when explaining the application of theory to practise.

2. To ensure that group discussions, case study / problem solving activity relate to and reflect the different aspects of practice represented within the classroom.

3. Where guest lecturers are used, they will be briefed by the module tutor to ensure that they are aware of the student profile and that the proposed presentation accommodates this.

4. Students will be supported by tutorial discussions between the tutor and student to ensure that the proposed learning reflects the practice needs of the student.

5. To ensure that the assessment strategy and methods of assessment are sufficiently flexible to enable students to apply and demonstrate their learning in a context which is relevant to them.

The learning and teaching methods adopted reflect the QAA Master's degree characteristics descriptors in the following ways:

- Lectures are used to impart key information and show case new ways of working which will enable students to develop a sound understanding of the principles of their field of study as well as identifying new ways of working.
- Case studies, role plays and group working will be used to facilitate application of the principles more widely. They will also be used to prompt discussion and practise problem solving skills. This will also allow students to evaluate the appropriateness of different approaches to solving problems.
- The use of portfolios facilitates reflection on the qualities necessary for employment, requiring the exercise of personal responsibility and decision making. Additionally, they will allow students to identify the limits of their knowledge and skills and identify strategies for development.
- Assessments are used to facilitate learning as well as providing an indication of student achievement.

The programme team has developed a strategic approach to delivering learning and teaching which meets the needs of the student group, enables skills development, allows for the practical application of knowledge and encourages students to become reflective and critically evaluative practitioners. The balance between face-to-face lectures and directed study is detailed within the module specifications. Students will be encouraged, through classroom activities and assessments, to reflect on both their own and organisational behaviour in order to improve their performance as well as

giving them the knowledge and confidence to contribute towards the development of their organisational performance.

Learning and Teaching are activities which operate at different levels simultaneously. To the student the immediate activity relates to the explicit topics being studied. However, transferable skills are also inherent in order for the student to both carry out the tasks and to develop. These elements are built into the modules comprising the programme as what might be called embedded issues. Other embedded issues, such as awareness of environmental impact, sustainability and commercial implications are also integrated in modules throughout the programme.

Knowledge and Understanding
Acquisition of knowledge is by means of lectures, practical and laboratory-based exercises, investigative exercises involving searching of various sources, directed reading and further reading. Pre-written notes will have a role in supporting these activities. Understanding is developed through tutorials, discussion, evaluation exercises and individual exercise sheets.

Intellectual Skills
These skills are developed by the students undertaking individual activities, within tutorials and practical sessions, or by being required to contribute to group activities. In each case, throughout the course a range of problems are set requiring the student to carry out information searches, analysis, design formulation, synthesis, test definition, modelling (software based), a methodology or by calculation. Reflective self-evaluation forms part of this. Critical evaluation is encouraged via debate and discussion in the tutorials.

Key Skills
Key skills include: communication skills, ability to work in a group or on one's own, management of time, use of computers and other technology, the application of calculations (the discipline of regularly attending and contributing to classes exercises the transferable skills of self-management and time management). Each module specification provides examples of transferable skills covered within its learning outcomes. Beyond this most modules require performance in several skill areas including self-management, communication and use of computer packages. All of these are monitored by the module tutors and feedback given.

VLE (Virtual Learning Environment)
Extensive use is made of Glyndŵr University's VLE, Moodle, to enhance the learning experience.

Moodle is used by staff to provide information about the courses and individual modules, and also as a repository of lecture notes and links to other sources of information.

26 Work based/placement learning statement

There are no placements on the programme.

27 Welsh medium provision

Students are entitled to submit assessments in the medium of Welsh. Where a need for Welsh medium assessment has been identified and no appropriate Welsh speaking tutor/assessor is available, the written assessment will be translated into English. This translation will be conducted by University qualified translators. .

28 Assessment strategy

The programme provides opportunities for formative, diagnostic and summative feedback. The assessment methods used reflect the needs of the student group and allows for the knowledge and learning outcomes of the programme to be tested as well as allowing for the development and assessment of practical and transferable skills.

Where assessed group work is undertaken, students will be expected, through the production of meeting notes and action plans, to demonstrate that they have contributed equally to the task. This element of personal contribution will determine the individual's overall module assessment. i.e. not all students within a group should expect the same mark.

Assessment Methods

Formal Written Examinations
These have been defined as being at a maximum length of 3 hours for a module which has no assignment element. The examinations are formally defined and centrally conducted via Glyndŵr University's Assessment Office.

Coursework
This is a single task given to the student in the form of a 'brief' defining the assignment requirements at or near the beginning of the module. This may require the student to carry out investigations and literature searches in their own time and under their own initiative or it may require independent problem solving based on work covered in the lectures/tutorials. The work is normally required in the form of a formal report submitted by a given deadline. Sometimes a presentation, either individually or as a group forms part of the assessment.

Portfolio
This is a term referring to a collection of small, and perhaps diverse, exercises whose individual marks are brought together in a single folder to form a single in-course mark. Examples are where a series of laboratory exercises form part of the module. Feedback is given after each exercise (called formative assessment) so that a student is aware of progress made on an on-going basis.

Continuous Assessment
Some modules use continuous assessment whereby a set of progressive exercises are used to build up to the achievement of a major task. Each exercise is given a mark (called summative assessment) and feedback given, usually during class, in order to help with the next stage. The final mark is a combination of these marks. It is also the preferred method of assessment for the project, as the student project develops there are interim points for assessment which are inclusive of VLE quizzes, presentations, log books, and staged formal reports. The feedback to the student is thus also continuous and assists the students to achieve their potential.

Case Study

For some modules, a case study might be the most appropriate form of assessment whereby the student would investigate a particular scenario, software programme or an instrumentation system. They would analyse the 'subject' and convey their critical opinions, this could be verbally (oral presentation) or a short report. Frequently the student is given three or four scenarios to consider simultaneously, thereby enabling comparison of advantages and disadvantages.

Feedback to students

Formative assessment is essential to learning in its aim is to give appropriate and timely feedback to students on their learning, and to help them to improve their future work.

Feedback, both formal and informal is given to students throughout the programme. Feedback may be verbal, given during tutorials or lab exercises, where both student and lecturer can identify problems and steps can be taken to improve future work. Feedback is presented as part of a continuous assessment plan, such as the development of Journals or Learning Logs; this may be verbal or written feedback, or it may be formal written feedback, as in the case of assignment marking with comments.

It should be noted that much of the feedback, not only identifies problems along with suitable guidance, but also highlights the student's achievements. This approach usually works better than simply "must try harder".

In some cases, 'progressive feedback' is the most suitable approach, particularly when there are many problems with an individual student's work. i.e. do not try to mend everything all at once, as this can lead to the student becoming demoralised, but rather work on the most important aspects first, whilst introducing other improvements later.

The following diagram provides an overview of module assessments and indicative submission dates.

Module code & title	Assessment type and weighting	Assessment loading	Indicative submission date
ENG740 Engineering Research Methods & PG Studies	*50% Report 50% Research Proposal*	*2500 words 2500 words*	*Wk 20, Tri 1 Wk 24, Tri 1*
ENG765 Engineering Design & Innovation	*50% Group Project 25% Reflective Practice 25% Presentation*	*2500 words 1500 words 5 Minutes*	*Wk 18, Tri 1 Wk 19, Tri 1 Wk 20, Tri 1*
ENG741 Engineering Systems Modelling & Simulation	*50% Coursework 50% Coursework*	*2500 words 2500 words*	*Wk 24, Tri 1 Wk 25, Tri 1*
ENG742 Advanced and Composite Materials Version 3	*50% Coursework 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG766 Structural Integrity & Optimisation	*50% Coursework 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*

ENG768 Applied Aerodynamics & Flight Mechanics	*50% Coursework 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG769 Industry 4.0 Manufacture and Production	*50% Report 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG767 Advanced Automotive Chassis, Engine, Powertrain and Control	*50% Report 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG757 Design with Composites	*50% Coursework 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG758 QA, Assembly and Repair of Composites	*50% Case Study 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG773 Advanced Control Engineering and Systems Analysis	*50% Coursework 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG775 Power Electronics, Drives and Energy Systems	*100% Examination*	*3 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG736 Analysis of renewable and Sustainable Systems	*50% Coursework 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG774 Circuit Design and Electronic Testing	*50% Coursework 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENG770 Mechatronics System Design	*50% Case Study 50% Examination*	*2000 words 2 hours*	*Wk 38, Tri 2 Wk 42, Tri 2*
ENGM66 Dissertation	*20% Presentation 80% Dissertation*	*20 min 15,000 words*	*Dependant on mode of study*

29 Assessment regulations

The regulations for Taught Masters programmes apply to these programmes.

Derogations

Derogation 1

For Engineering Masters degrees, credits shall be awarded by an assessment board for those Level 7 modules in which an overall mark of at least 50% has been achieved with a minimum mark of 40% in each assessment element.

Derogation 2

- The students started studying a full time Masters programme in January should complete the programme no more than 18 months after approved commenced date. A full time January intake student who fails to complete the programme at

the first attempt shall be required to complete all requirements within the registration period of 30 months.

Restrictions for trailing modules (for taught masters programmes only)

A student may progress to Part Two when 120 credits have been studied and at least 100 credits have been passed and the referred module is eligible to be trailed, apart from ENG740 Engineering Research Methods and Postgraduate Studies module which is not eligible to be trailed.

30 Programme Management

The programmes will be managed under the auspices of the school of Applied Science, Computing and Engineering and the programmes will develop and operate within the terms of the overall management of curriculum within the school. The designated Programme Leaders for the proposed MSc programmes will be responsible for the day-to-day running of the programme, including the following:

- The management and development of curriculum and the course portfolio,
- Student tracking and student records
- Collation of assessment data, presentation of data at assessment boards
- Management/co-ordination of overall assessment activities across the programmes
- Liaison with external bodies and agencies,
- Quality assurance and annual monitoring, including compilation of the Annual Monitoring Report
- Co-ordination of admissions activities and other recruitment activities, including relevant publicity activities
- The programme leaders are responsible for preparing the Annual Monitoring Report on the MSc Engineering provision.

The module leader takes responsibility for the following:

- The maintenance and development of teaching and learning materials for all students enrolled on the module,
- The publishing and updating of module timetables,
- The setting, marking and collation of marks for all module assessments and examination papers, including resit assessments, and submission of student results to the Programme Leader
- Tutorial support for students taking the module which they are responsible
- Quality monitoring, including processing of annual student feedback questionnaires and, where appropriate, student feedback for individual modules

The programme team meeting

The Programme team meeting is held regularly, consisting of the staff from the teaching team, the programme leader, student representatives, invited representatives of other departments (such as Learning Resources and Information Services) and the Head of School. Colleagues from Industry will also be invited where appropriate. Programme team meetings will take place at least three times per year and will respond to the on-going needs of the programmes as they arise, reporting directly to the Subject, School and University management when appropriate.

Programme monitoring and review

Programme monitoring and review is taken very seriously. It is an on-going process which involves everyone concerned with the programme as well as others within the Subject, Academic Registry, members of the Learning and Teaching Quality Committee (LTQC) and student feedback (e.g. module evaluation and Student Voice Forums). In practice, the Programme Leader and teaching team will monitor the day-to-day operation with input as necessary from student representatives.

The Student Voice Forum (SVF) is a student-staff consultative meeting. Student representatives, who are elected by the students, meet lecturing staff on the programme once a trimester to exchange ideas about the programme. This allows students to communicate their shared concerns, and for the staff to react and respond speedily to address their concerns.

Prior to the SVF meeting an agenda is set and distributed to all participants. The meeting held with the students is minuted and actioned accordingly. Copies of the minutes are uploaded to Moodle and given to the student representatives to disseminate the information back to the group. The points arising at SVF are then discussed at the programme team meeting with the Head of School present. If the raised issues cannot be resolved at this level, it will be referred to other meetings such as Engineering Team meetings. The student representatives will be provided with the written feedback at any stage of the discussion of the issues have to be solved.

In line with the University's QA systems and procedures an annual monitoring report (AMR) will be prepared by the Programme Leaders in November of each academic year and formally discussed and presented to the Subject Team at a meeting which takes place during November/December before it is considered by the School board in Nov/Dec as part of the annual monitoring and review processes (AMR). The AMR will include performance of modules as well as overall programme performance using indicators such as mean, standard deviation, retention data and feedback from students and staff.

There is also staff monitoring and review which is external to the programme which is based on the principles of peer observation and this is fed into the appraisal process to support individual staff development plans.

Programme leader

Dr Shafiul Monir	MSc Engineering: MSc Engineering (Aeronautical) MSc Engineering (Mechanical Manufacture) MSc Engineering (Automotive) MSc Engineering (Composite Materials)
Dr Yuriy Vagapov	MSc Engineering:

MSc Engineering (Renewable & Sustainable Energy)
MSc Engineering (Electrical & Electronic)
MSc Engineering (Mechatronics)

Module Leaders

Engineering Research Methods & PG Studies	S.Monir
Engineering Design & Innovation	D.Sprake
Engineering Systems Modelling & Simulation	S.Monir
Advanced and Composite Materials	N Luhyna
Structural Integrity & Optimisation	M.Jones
Applied Aerodynamics & Flight Mechanics	Z Chen
Industry 4.0 Manufacture and Production	M.Jones
Advanced Automotive Chassis, Engine, Powertrain and Control	O.Duriex
Design with Composites	M.Jones
QA, Assembly and Repair of Composites	M.Jones
Advanced Control Engineering and Systems Analysis	Z.Chen
Power Electronics, Drives and Energy Systems	Y.Vagpov
Analysis of renewable and Sustainable Systems	D.Sprake
Circuit Design and Electronic Testing	A.Sharp
Mechatronics System Design	A.Sharp

Link to Staff Profiles

https://www.glyndwr.ac.uk/en/StaffProfiles/DavidSprake/
https://www.glyndwr.ac.uk/en/StaffProfiles/MartynJones/
https://www.glyndwr.ac.uk/en/StaffProfiles/NickBurdon/
https://www.glyndwr.ac.uk/en/StaffProfiles/ShafiulMonir/

31 Quality Management

Each module will be assigned to a named module leader who will take responsibility for the delivery of the learning, teaching and assessment of the module. In keeping with the policies and procedures agreed by the University, the key mechanism for quality control and enhancement at programme level will be the processes and procedures associated with the annual monitoring cycle which is formalised through the production of the Annual Monitoring Report (AMR). The AMR evaluates the programme delivery drawing on feedback from students, the professional body, external examiners and employers. Specific methods used for consulting students include the completion of Module Evaluation Questionnaires, Student Voice Forums and end of year group feedback sessions. The outcomes of the AMR are scrutinised and agreed at Programme Level with subsequent monitoring and review being formalised though the School Board and the Learning and Teaching Quality Committee.

Feedback will be provided to students in the following ways:

- Minutes and responses to Student Voice Forum (SVF) will be posted on the VLE.
- External Examiner reports and any associated actions arising will be presented to students in the November SVF.

- An overview of the draft AMR and associated actions will be presented to the SVF in November.
- An update on achievement of AMR Action plans will be provided in the March SVF.

The Programme team meet monthly in order to monitor programme performance. Issues discussed include recruitment and retention, student feedback, assessment calendars, approaches to teaching and learning, coordination of site visits and guest lecture plans. Peer observation is undertaken; this includes classroom based observation as well as peer review of marking, assessment and feedback.

Whilst the Programme Leader is responsible for day to day management of the programme, Personal Tutors will ensure the welfare and development of each student on the programme throughout their period of study.

Feedback from students
Student Representatives will be elected from the student group, and will attend the SVF meetings to provide a student input. The representative will also be able to bring urgent matters to the Programme Leader's attention by a direct approach.

Open Door Policy
Staff operates an open door policy, whereby students may ‘pop in’ to have a chat about anything they may be concerned about, or need some help with. The feedback from the students, indicate that this is the most useful method of communicating and usually resolves any issues immediately.

Whilst the Programme Leader is responsible for day to day management of the programme, Personal Tutors will ensure the welfare and development of each student on the programme throughout their period of study.

32 Research and scholarship activity

The team are committed to ensuring that their knowledge remains current and relevant to changing practice. Additionally they ensure that they reflect on and develop their teaching practice through engagement teaching related CPD. The section below provides a brief outline of activities undertaken across the team.

Academic Research
The University Research Centre for Applied Science, Engineering and Computing brings together several strands of inter-related research of national and international standing. Key themes are Materials and Manufacturing (including advanced composites, large scale precision optics, Unmanned Aerial Vehicle optical sensor development, water soluble polymers and photovoltaics), Internet technologies and Communication, and Engineering (fluid dynamics).

The 2014 Research Excellence Framework (REF) deemed more than 90 per cent of Glyndŵr University’s electrical engineering, materials and computer science research assessed in a new survey is of international significance.

The Centre’s focus is on applied research producing results which can be applied in a wide range of industry sectors.

Staff and research students are based at the University's main Plas Coch Campus in Wrexham, and at the specialist facilities in St Asaph (hosting large scale precision optics and Photovoltaic Research) and Broughton (hosting the Advanced Composite Materials Research).

Research groups with a focus on specific issues include:

- Advanced Composite Training and Development Centre
- Analytical Decision Making Research Group (ADM)
- Centre for Water Soluble Polymers (CWSP)
- Computational Mechanics, Manufacturing simulation, Design and Optimisation Group (CoMManDO)
- National Facility for Ultra Precision Surfaces
- Centre for Ultra-realistic Imaging (CURI)

The recent research undertaken by the School of Applied Science, Computing and Engineering in the area of automation and industrial engineering includes:

PCB Function Testing: investigation and development of automated test equipment for PCB functional testing. Functional PCB test beds have been developed, tested and integrated into manufacturing process of electric drive control systems.

Induction Motor Diagnostics using DSP: research has recently been completed on induction motor diagnostics, the outcome of the research is a method of DSP analysis of induction motor input currents to detect broken bars of the squirrel cage rotor winding. The proposed method has been successfully verified through a number of laboratory tests and is ready for industrial implementation to monitor the induction motor performance.

Electric Drive Inverter: an investigation and analysis of power electronic invertors for electric drives operating under random pulse width modulation. Implementation of random based control algorithm flats the spectrum density of the invertor output ac voltage and decreases the level of acoustic noise in an induction motor.

Non Linear Processes with dead time: within industrial process control pH can be one of the most challenging parameters to successfully control with conventional proportional plus integral plus derivative (PID) controllers. PID algorithm being unable to successfully cope with the pH's highly non-linear gain and long dead times. Implementing predictive control schemes using mathematical models of the process, incorporating dead time and gain compensation using fuzzy logic and artificial neural networks has been implemented on a 400 Ml/d Water Treatment Works which has providing a robust control system with optimal system response.

Industrial Consultancy and KTPs (Knowledge Transfer Partnerships)
Several members of staff have direct links with individual industries. Many of these have been a consequence of past students obtaining positions of influence. These have resulted in a range of involvements including:

- Individual consultancy to solve specific problems
- Utilising government-funded KTPs to develop longer-term projects
- Production of undergraduate and post graduate student projects

Examples of these activities are:

Use of the Materials Laboratory to investigate failure of components due to corrosion; which although was completed previously, still has relevant information that has been used to inform the Plant Equipment Fundamentals module.

A KTP project aimed at optimising control systems used in water treatment processes for a major utilities supplier has provided real data and insight into real control problems. This has contributed toward the development of the Diagnostics & Testing and Instrumentation & Control modules.

Attendance at seminars and professional training courses
All lecturers are expected to undertake 'scholarly activities' as part of their professional role and this may include research or other activities such as CPD (continuing professional development). Within this each staff member is expected to maintain the currency of knowledge and developments within his/her subject area. To do this, staff is encouraged to attend seminars or to attend training courses. The form of these varies from one-day manufacturers' courses, through short courses to full academic courses, and even study for further degrees.

Information from the IET Power Electronics, Machines and Drives conference has helped inform the content of the Electrical Power Systems and Drives module.
Besides the more measurable forms of scholarly activity, most of the team are involved in day to day activities all of which contribute towards the currency of the curriculum development. This might include reading monthly journals, IET magazines, interesting internet articles, manufacturers' information and most importantly relevant information from our industrial contacts.

The annual Profibus User Group is attended by team members. This has given an insight into key practical issues arising from the use of digital communications technologies in automated manufacturing and process industry applications. Covering the use of PROFIBUS and PROFINET in key application areas such as pulp & paper, chemical, utilities.

Other External Activity.
ERASMUS participation
Presentation at Conferences

Teaching Related Activity

- External examiners on related programmes
- Assessors on Professional Body Panels
- Engagement in Peer Observation

33 Learning support

Institutional level support for students

The University has a range of departments that offer the support for students as:

- Library & IT Resources
- The Assessment Centre
- DisAbility Support Team
- Irlen Centre
- Careers Centre and Job Shop
- Zone Enterprise hub
- Chaplaincy

- Counselling & Wellbeing
- Student Funding and Welfare
- International Welfare
- Student Programmes Centre
- Glyndŵr Students' Union

School support for students

All students at Wrexham Glyndŵr University are allocated a Personal Tutor whose main responsibility is to act as the first point of contact for their personal students and to provide pastoral and academic support throughout their studies at the University. It is a vital role to support student engagement and retention, and to help every student to success to the best of his or her ability.

Programme specific support for students

On the individual level, students will be supported in their learning in the following ways:

- Students will have access to the school based specialist resources.
- Students will be provided with a programme handbook which details their programme of study and signposts them to University level support mechanisms, policies and regulations.
- Student academic support needs will be met in the following ways.
    i. Individual tutorials with academic tutors to identify individual learning needs and aspirations which will then be monitored throughout the programme.
    ii. Following confirmed assessment of learning needs, the team will make reasonable adjustments to assessments in order to reflect the needs of students with support needs.
    iii. Tutors will use the VLE as a repository for course material and are actively engaging in developing opportunities to use this to provide feedback to students, promote online discussion and promote a VLE academic community.
    iv. Pastoral support will be provided by a named personal tutor who will remain with them for the duration of their study. Should a student wish to change their personal tutor during their period of study this can be accommodated.
    v. The University study skills tutor will be available to support and guide students for on-going individual and/or small group support on a self-referral basis throughout the year including the semester 3 summer period.
    vi. Induction programmes will include Study Skills and IT and the VLE.

Each programme will have arrangements in place for a programme student representative. This representative will be invited to attend SVF meetings and where appropriate, relevant Institutional meetings.

34 Equality and Diversity

Glyndŵr University is committed to providing access to all students and promotes equal opportunities in compliance with the Equality Act 2010 legislation. This programme complies fully with the University's Equal Opportunities Policy (http://www.glyndwr.ac.uk/en/AboutGlyndwrUniversity/Governance/TheFile,64499,en.

pdf), ensuring that everyone who has the potential to achieve in higher education is given the chance to do so.

DATE OF APPROVAL	
Date of programme delivery approval event:	*04 October 2019*
Date of approval by Academic Board:	30 April 2020

APPENDIX 1 – PARTNER PROVIDER SUPPLEMENT TO PROGRAMME SPECIFICATION

When printed this becomes an uncontrolled document. Please check the Programme Directory for the most up to date version by clicking here.

Programme Title(s):
MSc Engineering (Electrical & Electronics)
MSc Engineering (Mechatronics)
MSc Engineering (Mechanical Manufacturing)

This is the intended award title from the definitive Programme Specification and what will be printed on the award certificate.

1	***Awarding body***
	Glyndŵr University
2	**Partner Provider**
	Dimensions International College
3	**Location of delivery**
	Dimensions International College, 277 River Valley Road Singapore 238318
4	**Faculty/Department**
	Faculty of Arts, Science and Technology
5	**Mode of study**
	Full time
6	**Frequency / timing of intake/s**
	4 intake point per academic year (July/October/January/April)
7	**Language of study**
	English

8	Name of academic link (correct at the point of programme approval)
	Andrew Sharp

35 9 GU Approved Partner Programme Delivery Schedule(s)

Glyndwr University Programme Academic Calendar (2020 - 2021)

Part A - Programme Information

General Programme Information

Programme Name	Cohort	Teaching Start Date
Msc Engineering (Electrical & Electronic) *Msc Engineering (Mechatronics)* *Msc Engineering (Mechanical Manufacturing)*	*MEEE 01* *MEMT 01* *MEMM 01*	*6/7/2020*
Admissions Cut Off Date		
20/7/2020		

Term Information

Semester	Dates	Modules taught during the semester		
		Msc Engineering (Electrical & Electronic) MEEE	**Msc Engineering (Mechatronics) MEMT**	**Msc Engineering (Mechanical Manufacturing) MEMM**
Sem I	6-Jul-20 to 2-Oct-20	ENG765 Engineering Design and Innovation & ENG741 Engineering Systems Modelling and Simulation		
Sem II	5-Oct-20 to 31-Dec-20	ENG 774 Circuit Design and Electronic Testing		ENG766 Structural Integrity & Optimisation
		ENG 775 Power Electronics, Drives and Energy Systems	ENG 770 Mechatronics System Design	ENG769 Industry 4.0 Manufacture and Production
Sem III	4-Jan-21 to 1-Apr-21	ENG773 Advanced Control Engineering and System Analysis and ENG740 Engineering Research Methods and PG Studies		
Sem IV	5-Apr-21 to 2-Jul-21	ENGM66 Dissertation		

Programme Assessment Information

Module Codes / Title	Credit Value	Assessment Method	Weighting (%)	Assignment hand-out date to students	Deadline for assignment submission / Exam Date	Deadline for feedback to students	Exam Board Date
ENG765 Engineering Design and Innovation	20	Group Project - 2500 words	50	7/7/2020	28/8/2020	25/9/2020	23/11/2020
		Reflective Practice - 1500 words	25	7/7/2020	11/9/2020	9/10/2020	
		Presentation - 5 minutes	25	7/7/2020	26/9/2020	26/9/2020	
ENG741 Engineering Systems Modelling and Simulation	20	Coursework 1 - 2500 words	50	7/7/2020	14/8/2020	18/9/2020	
		Coursework 2 - 2500 words	50	7/7/2020	25/9/2020	23/10/2020	