PROGRAMME SPECIFICATON

1	**Awarding body**
	Glyndŵr University
2	**Teaching institution**
	Glyndŵr University
3	**Award title**
	MSc / PGD Automotive Engineering MSc / PGD Composite Material Engineering MSc /PGD Unmanned Aircraft System Technology PGC Engineering
4	**Final awards available**
	MSc, PG Dip, PG Cert
5	**Professional, Statutory or Regulatory Body (PSRB) accreditation**
	The EAB is coordinating an accreditation visit in Autumn 2017. Following this visit by the awarding bodies, it is intended that these courses will be accredited with effect from September 2017.
	Accreditation available
	Please add details of any conditions that may affect accreditation (eg is it dependent on choices made by a student?)
6	JACS3 **codes**
	MSc Automotive Engineering - H330 MSc Composite Material Engineering – H700 MSc Unmanned Aircraft System Technology - H410
7	UCAS **code**
	N/A
8	**Relevant QAA subject benchmark statement/s**
	QAA Subject Benchmark Statement Engineering (2015) [Although UG it has been used for reference] http://www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf QAA Master's degree characteristics.
9	**Other external and internal reference points used to inform the programme outcomes**
	Engineering Council, UK-SPEC third edition (2014)

Engineering Council, UK-SPEC document "The Accreditation of Higher Education Programmes" third edition

Sector Skills Council for Science, Engineering and Manufacturing Technologies (SEMTA)

CAA CAP 393 Air Navigation: The Order and the Regulations
CAA CAP 722 Unmanned Aircraft System Operations in the UK Airspace- Guidance

10 Mode of study

Full & part time

11 Language of study

English

Office use only	
Date of validation event:	14 December 2016
Date of approval by Academic Board:	21 February 2017
Date of revision:	
Date of revision:	

12 Criteria for admission to the programme

Standard entry criteria

A first degree or equivalent qualification or experience in a subject deemed appropriate by the admitting program leader e.g.

MSc Automotive Engineering:
A Bachelor's Degree or equivalent in an engineering subject such as Electrical or Mechanical engineering.

MSc Composite Material Engineering:
A Bachelor's Degree or equivalent in an engineering subject such as Materials, Manufacturing or Mechanical engineering.

Unmanned Aircraft System Technology:
A Bachelor's Degree or equivalent in an applicable science or engineering based subject such as Physics, Chemistry, Geology, Geography, Ecology, Surveying, Architecture, Manufacturing, Electrical, Electronic, Aerospace or Mechanical engineering.

International entry qualifications

Qualifications outlined on the National Academic Recognition and Information Centre (NARIC) as equivalent to the above UK entry qualification.

Programme specific requirements

N/A

Non-standard entry criteria
(e.g. industry experience)

Other learning and experience may be considered for entry to the programme. A student may be allowed entry if he or she does not have the standard entry qualifications but can provide evidence of necessary knowledge and skills to successfully enter and complete the course.

English language requirements

The University's English language requirements are set out at http://www.glyndwr.ac.uk/en/Howtoapply/Readytoapply/

✓ **Postgraduate**

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, with an overall score of 6.5 and no component below 6.0.

International students require a UKVI Approved Secure English Language Test (SELT), achieving an overall score of 6.5 with no component below 6.0 (please see http://www.glyndwr.ac.uk/en/Internationalstudents/EntryandEnglishLanguageRequirements/ for details). If arranging a test, applicants must ensure they book an 'IELTS for

UKVI' test. For further information see: http://takeielts.britishcouncil.org/ielts-ukvi/book-ielts-ukvi. Applicants are asked to note that only an *IELTS for UKVI* test result will be accepted.

13 Recognition of Prior (Experiential) Learning

Applicants may enter the programme at various points 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 requirements

N/A

14 Aims of the programme

The key aim of the programmes is to develop the intellectual and application skills of individuals by means of personal management, knowledge acquisition, complex problem analysis, critical evaluation, deductive skills, synthesis and evaluation of solutions, and including an awareness of social and environmental implications, in preparation for:

MSc Automotive Engineering

- A career as a professional design engineer in the Automotive Industry.
- A management role in the automotive industry.
- Life-long learning and an appreciation of the value of education and research in continuing professional development.

MSc Composite Material Engineering

- A career as a professional design engineer in the Composite Materials Industry.
- A management role in the Composite Materials industry.
- Life-long learning and an appreciation of the value of education and research in continuing professional development.

MSc Unmanned Aircraft System Technology

- Entrepreneurial success in the growing Unmanned Aircraft System (UAS) industry sector.
- A career in the design, manufacture or maintenance of UAS.
- The application of UAS technology to specialist scientific, research and data gathering missions.

These courses provide the breadth of learning, skills and attitudes for candidates to meet the future needs of rapidly changing technology and business environments.

15 Distinctive features of the programme

MSc Automotive Engineering

The programme has been developed to meet the demands of industry to provide engineering qualifications that not only cover the traditional theoretical aspects associated with this vocation but also encompass new and emerging technologies. The programme integrates academic learning through close collaboration with our industry partners.

Both local and national organisations have had significant input into the development of the programme, particularly relating to programme and module content, ensuring it is 'fit for purpose'. Also students, both past and present, have been involved with the programme development, whereby scheduling of delivery and assessment has been influenced by student feedback. Many previous students have progressed into senior engineering and management roles. The programme team have assimilated feedback from various consultations and research to provide a solid basis for this new programme.

Mechanical transmission systems, automation equipment, smart sensors, process instrumentation and automation equipment have been donated by the Industry partners. We have also invested in the latest Profibus diagnostic equipment and Siemens Totally Integrated Automation platform software. This investment enhances the student experience, as they are dealing with industrial standard equipment rather than 'educational training equipment'.

MSc Composite Material Engineering

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 in Composite Material Engineering 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.

Students will be taught by lecturers from industrial and research background through a combination of lectures, tutorials, Laboratory sessions and computer classes. Industry standard software will be taught to enable the students to graduate with the skills required for industry.

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

For more details and opportunities please see The 2016 UK Composites Strategy below:

http://www.compositesleadershipforum.com/uk-composites-strategy https://compositesuk.co.uk/system/files/documents/Strategy%20final%20version_1.pdf

MSc Unmanned Aircraft System Technology

This MSc in Unmanned Aircraft System Technology is designed to equip practitioners of the future with the in-depth knowledge required to safely and legally design, manufacture and operate SUA (up to 20kg MTOM) here in the UK.

Small Unmanned Aircraft (SUA) which are more commonly referred to as "Drones", are being used for civil purposes in a growth business sector predicted to be worth £15 billion of pounds over the next 10 years. UASs are currently revolutionising everything from agriculture to film-making and are increasingly being used to monitor, research and conduct data gathering missions in surveying, mining, forestry, ecology, archaeology virtual reality and computer gaming. This degree is intended to address the looming skills shortage in this field and is ideal for workplace professionals wishing to pursue an interesting and relevant course to enhance their career development.

This is a practical, hands-on course in which the candidate will get to build, fly and keep their very own drone. An engineering degree qualification is not necessary to enrol on this course. Scientists across all disciplines who wish to adapt drone technology to their field of study and people from any industry, employed or self-employed, are eligible and encouraged to join the course. For example in agriculture, drones can be used to assess crops and yields. This can be achieved by understanding the technologies behind the drone and then adapting it for a specific purpose. The course is not so much about training people to become pilots, it's about providing the skills to extract and process data in a whole range of subject areas.

The candidate will learn the legal and safety aspects of advanced drone operations and

also plan missions and conduct actual operations in the field. Flying tuition will be provided by our Civil Aviation Authority (CAA) qualified staff using our drone simulator and also out on our dedicated flight-test field.

16 Programme structure narrative

The programmes will be delivered on a full and part time basis. The duration of the MSc Degrees will normally be one year (FT) and two and a half years (PT), all at level 7. Part One is the taught part of the course and consists of 120 credits, made up of 20 credit modules. Part Two is the Dissertation and is a further 60 credit module.

There will be two entry points to the MSc programmes in Automotive Engineering and Composite Materials Engineering for full time students, and these will be in September and January.

Full-time Mode (September Intake)

The taught element, Part One, of the programmes 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 expected timetable per module 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. Students will study the three common modules 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. This means that the duration for the January full time intake will be approximately 15 months.

Part-time Mode

The taught element, Part One, of the programmes 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 of the second year 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.

The MSc in Unmanned Aircraft System Technology has a single entry point in September for both full and part time students.

The exit points are PG Dip and PG Cert:

Post Graduate Diploma (PG Dip) requires the achievement of 120 credits taught at level 7 and will be awarded with applicable titles as follows;

- Post Graduate Diploma in Automotive Engineering
- Post Graduate Diploma in Composite Materials Engineering
- Post Graduate Diploma in Unmanned Aircraft System Technology

Post Graduate Certificate (PG Cert) requires the achievement of any combination of modules amounting to 60 credits across any programmes/routes and will be awarded with the following generic title applicable to all programmes;

- Post Graduate Certificate in Engineering

Part one of the Automotive Engineering and Composite Materials Engineering programmes consists of three 20-credit common taught modules and three 20-credit specialist modules. Whereas, Part one of the Unmanned Aircraft System programme consists of two 20-credit common taught modules and four 20-credit specialist modules. Part One must have been completed successfully before the students can formally progress to Part Two, the MSc dissertation.

The suite of programmes are identified within the structure diagrams below.

17 Programme structure diagrams

MSc Automotive Engineering (full time)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Sustainable Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG706	Mod code	ENG741
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	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	Advanced Automotive Chassis and Control	Mod title	Advanced Engine Thermodynamics and Powertrain
	Mod code	ENG742	Mod code	ENG755	Mod code	ENG756
	New/Existing	Existing	New/Existing	New	New/Existing	New
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	R.Day	Mod leader	O.Durieux	Mod leader	O.Durieux
Summer period	Mod title	Dissertation	Mod title		Mod title	
	Mod code	ENGM66	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	60	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	

MSc Automotive Engineering (part time)

Year 1

Semester 1	Mod title	Sustainable Design and Innovation	Mod title	Engineering Systems Modelling and Simulation	Mod title	
	Mod code	ENG706	Mod code	ENG741	Mod code	
	New/Existing	Existing	New/Existing	Existing	New/Existing	
	Credit value	20	Credit value	20	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	D.Sprake	Mod leader	S.Monir	Mod leader	

Semester 2	Mod title	Advanced & Composite Materials	Mod title	Advanced Automotive Chassis and Control	Mod title	
	Mod code	ENG742	Mod code	ENG755	Mod code	
	New/Existing	Existing	New/Existing	New	New/Existing	
	Credit value	20	Credit value	20	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	R.Day	Mod leader	O.Durieux	Mod leader	
Summer period	Mod title		Mod title		Mod title	
	Mod code		Mod code		Mod code	
	New/Existing		New/Existing		New/Existing	
	Credit value		Credit value		Credit value	
	Core/Option		Core/Option		Core/Option	
	Mod leader		Mod leader		Mod leader	

Year 2

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title		Mod title	
	Mod code	ENG740	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	20	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	
Semester 2	Mod title	Advanced Engine Thermodynamics and Powertrain	Mod title	Dissertation	Mod title	
	Mod code	ENG756	Mod code	ENGM66	Mod code	
	New/Existing	New	New/Existing	Existing	New/Existing	
	Credit value	20	Credit value	60	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	O.Durieux	Mod leader	S.Monir	Mod leader	
Summer period	Mod title	Dissertation (continued)	Mod title		Mod title	
	Mod code	ENG M66	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	60	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	

MSc Composite Material Engineering (full time)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Sustainable Design and Innovation	Mod title	Engineering Systems Modelling and Simulation
	Mod code	ENG740	Mod code	ENG706	Mod code	ENG741
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	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
	New/Existing	Existing	New/Existing	New	New/Existing	New
	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
Summer period	Mod title	Dissertation	Mod title		Mod title	
	Mod code	ENGM66	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	60	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	

MSc Composite Material Engineering (part time)

Year 1

Semester 1	Mod title	Sustainable Design and Innovation	Mod title	Engineering Systems Modelling and Simulation	Mod title	
	Mod code	ENG706	Mod code	ENG741	Mod code	
	New/Existing	Existing	New/Existing	Existing	New/Existing	
	Credit value	20	Credit value	20	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	D.Sprake	Mod leader	S.Monir	Mod leader	

Semester 2	Mod title	Advanced & Composite Materials	Mod title	Design With Composites	Mod title	
	Mod code	ENG742	Mod code	ENG757	Mod code	
	New/Existing	Existing	New/Existing	New	New/Existing	
	Credit value	20	Credit value	20	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	R.Day	Mod leader	M.Jones	Mod leader	
Summer period	Mod title		Mod title		Mod title	
	Mod code		Mod code		Mod code	
	New/Existing		New/Existing		New/Existing	
	Credit value		Credit value		Credit value	
	Core/Option		Core/Option		Core/Option	
	Mod leader		Mod leader		Mod leader	

Year 2

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title		Mod title	
	Mod code	ENG740	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	20	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	
Semester 2	Mod title	QA, Assembly and Repair of Composites	Mod title	Dissertation	Mod title	
	Mod code	ENG758	Mod code	ENGM66	Mod code	
	New/Existing	New	New/Existing	Existing	New/Existing	
	Credit value	20	Credit value	60	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	M.Jones	Mod leader	S.Monir	Mod leader	
Summer period	Mod title	Dissertation (continued)	Mod title		Mod title	
	Mod code	ENG M66	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	60	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	

MSc Unmanned Aircraft System (UAS) Technology (full time)

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title	Sustainable Design and Innovation	Mod title	UAS Technology and Applications
	Mod code	ENG740	Mod code	ENG706	Mod code	ENG759
	New/Existing	Existing	New/Existing	Existing	New/Existing	New
	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	R.Bolam
Semester 2	Mod title	UAV Construction	Mod title	UAS Operations and the Law	Mod title	UAS Sensor Technology
	Mod code	ENG763	Mod code	ENG762	Mod code	ENG764
	New/Existing	New	New/Existing	New	New/Existing	New
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	R.Bolam	Mod leader	R.Bolam	Mod leader	R.Bolam
Summer period	Mod title	Dissertation	Mod title		Mod title	
	Mod code	ENG M66	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	60	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	

MSc Unmanned Aircraft System (UAS) Technology (part time)

Year 1

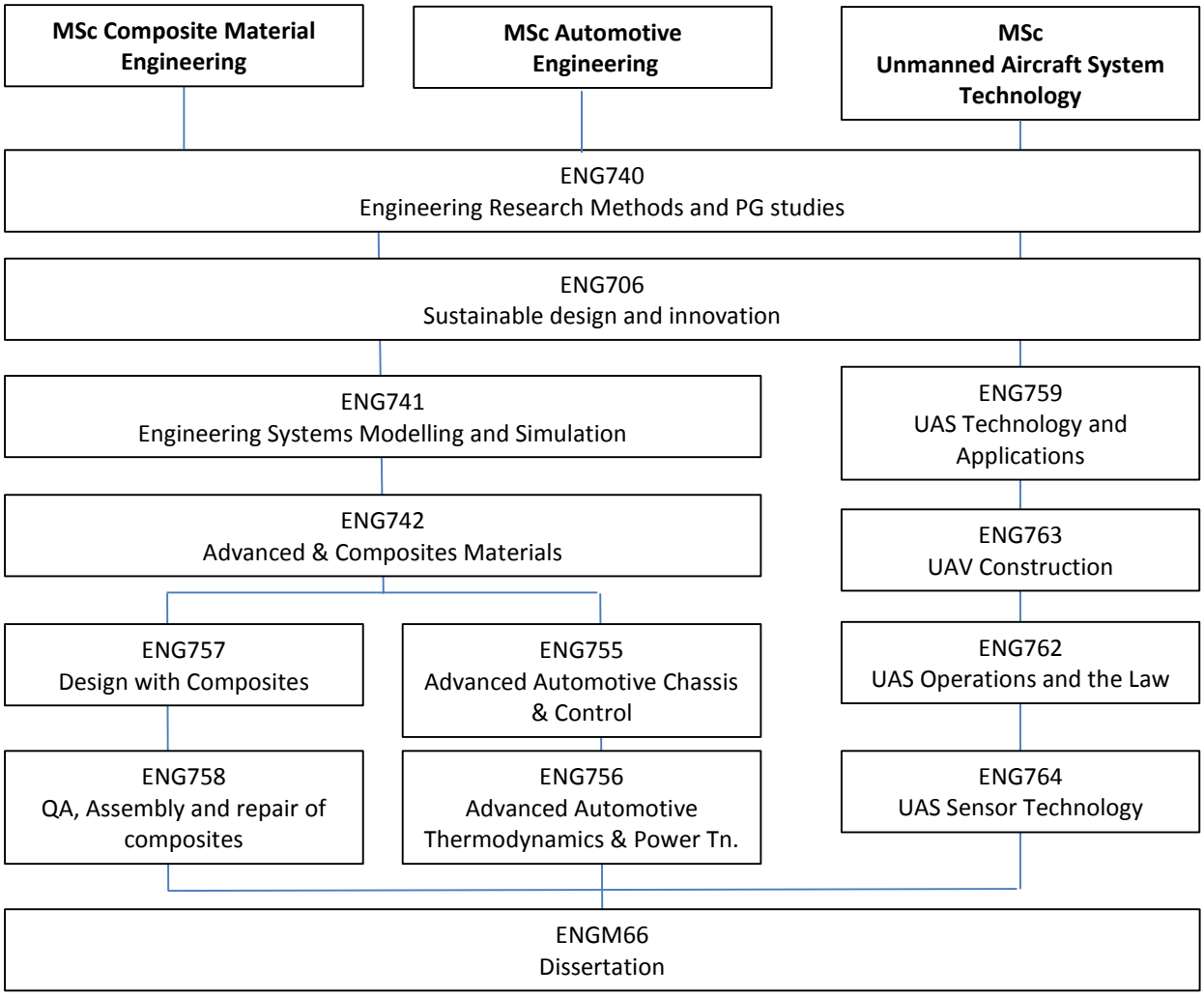
Semester 1	Mod title	Sustainable Design and Innovation	Mod title	UAS Technology and Applications	Mod title	
	Mod code	ENG706	Mod code	ENG759	Mod code	
	New/Existing	Existing	New/Existing	New	New/Existing	
	Credit value	20	Credit value	20	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	D.Sprake	Mod leader	R.Bolam	Mod leader	

Semester 2	Mod title	UAV Construction	Mod title	UAS Operations and the Law	Mod title	
	Mod code	ENG763	Mod code	ENG762	Mod code	
	New/Existing	New	New/Existing	New	New/Existing	
	Credit value	20	Credit value	20	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	R.Bolam	Mod leader	R.Bolam	Mod leader	
Summer period	Mod title		Mod title		Mod title	
	Mod code		Mod code		Mod code	
	New/Existing		New/Existing		New/Existing	
	Credit value		Credit value		Credit value	
	Core/Option		Core/Option		Core/Option	
	Mod leader		Mod leader		Mod leader	

Year 2

Semester 1	Mod title	Engineering Research Methods and PG Studies	Mod title		Mod title	
	Mod code	ENG740	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	20	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	
Semester 2	Mod title	UAS Sensor Technology	Mod title	Dissertation	Mod title	
	Mod code	ENG764	Mod code	ENGM66	Mod code	
	New/Existing	New	New/Existing	Existing	New/Existing	
	Credit value	20	Credit value	60	Credit value	
	Core/Option	Core	Core/Option	Core	Core/Option	
	Mod leader	R.Bolam	Mod leader	S.Monir	Mod leader	
Summer period	Mod title	Dissertation (continued)	Mod title		Mod title	
	Mod code	ENGM66	Mod code		Mod code	
	New/Existing	Existing	New/Existing		New/Existing	
	Credit value	60	Credit value		Credit value	
	Core/Option	Core	Core/Option		Core/Option	
	Mod leader	S.Monir	Mod leader		Mod leader	

Overall MSc Programme Structure Diagram



18 Intended learning outcomes of the programme

Learning outcomes common to all programmes covered by this document

	Knowledge and understanding		
	Post Graduate Certificate	Post Graduate Diploma	Masters
A1	Understand complex mathematical principles relevant to advanced concepts.	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.	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.	Practise the range of methodologies and computer tools available for analysis and design.
A4			Present an in depth understanding for the role of an engineer manager for himself/herself and others

	Intellectual skills		
	Post Graduate Certificate	Post Graduate Diploma	Masters
B1	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.	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.	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.	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.

Intellectual skills			
	Post Graduate Certificate	Post Graduate Diploma	Masters
B5			Plan, conduct and report on an original programme of work (dissertation)

Subject skills			
	Post Graduate Certificate	Post Graduate Diploma	Masters
C1	Demonstrate self-direction and originality in tackling and solving systems problems.	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.	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	Exercise initiative and personal responsibility.	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.	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.	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.	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.

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

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Explore current automotive engineering problems, being treated in a critical and evaluative manner.	Explore current automotive engineering problems, being treated in a critical and evaluative manner.
A6			Conduct research in recent automotive engineering developments and the context in which automotive engineering is applied.

Intellectual skills			
	Post Graduate Certificate	Post Graduate Diploma	Masters
B6			Apply planning and management techniques, with an evaluation of commercial financial implications, in the conduct and management of an automotive engineering project.

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

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Explore current composite material engineering problems, being treated in a critical and evaluative manner.	Explore current composite material engineering problems, being treated in a critical and evaluative manner.
A6			Conduct research in recent composite material engineering developments and the context in which composite material engineering is applied.

Intellectual skills			
	Post Graduate Certificate	Post Graduate Diploma	Masters
B6			Apply planning and management techniques, with an evaluation of commercial financial implications, in the conduct and management of a composite material engineering project.

In addition to the common Learning Outcomes listed above, the following Learning Outcomes are specific to MSc Unmanned Aircraft System Technology

Knowledge and understanding			
	Post Graduate Certificate	Post Graduate Diploma	Masters
A5		Explore current unmanned aircraft system (UAS) technology problems, being treated in a critical and evaluative manner.	Explore current unmanned aircraft system (UAS) technology problems, being treated in a critical and evaluative manner.
A6			Conduct research in recent unmanned aircraft system developments and the context in which UAS technology is applied.

Intellectual skills			
	Post Graduate Certificate	Post Graduate Diploma	Masters
B6			Apply planning and management techniques, with an evaluation of commercial financial implications, in the conduct and management of an unmanned aircraft system project.

19 Curriculum matrix

MSc Automotive Engineering

	Module Title	Core / option	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5
Level 7	Engineering Research Methods & PG Studies	Core	☐	■	■	■	■	■	☐	■	☐	■	■	■	■	■	■	☐	■	☐	■	☐	☐
	Sustainable Design & Innovation	Core	☐	■	☐	■	■	■	■	☐	☐	■	☐	■	■	■	■	☐	■	☐	☐	■	■
	Engineering Systems Modelling & Simulations	Core	■	■	■	■	■	■	■	■	■	■	☐	■	☐	■	■	■	■	■	■	■	■
	Advanced & Composite Materials	Core	■	■	■	■	☐	■	■	■	■	■	☐	■	■	■	☐	■	■	■	■	■	■
	Advanced Automotive Chassis and Control	Core	■	■	■	■	☐	■	■	■	■	■	☐	■	■	■	■	☐	■	■	■	■	■
	Advanced Engine Thermodynamics and Powertrain	Core	■	■	■	■	☐	■	■	■	■	■	☐	■	■	■	■	☐	■	■	■	■	■
	Dissertation	Core	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

MSc Composite Material Engineering

	Module Title	Core or option?	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5
Level 7	*Engineering Research Methods & PG Studies*	Core	☐	■	■	■	■	■	☐	■	☐	■	■	■	■	■	■	☐	■	☐	■	☐	☐
	Sustainable 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 Unmanned Aircraft System Technology

	Module Title	Core or option?	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	D1	D2	D3	D4	D5
Level 7	*Engineering Research Methods & PG Studies*	Core	☐	■	■	■	■	■	☐	■	☐	■	■	■	■	■	■	☐	■	☐	■	☐	☐
	Sustainable Design & Innovation	Core	☐	■	☐	■	■	■	■	☐	☐	■	☐	■	■	■	■	☐	■	☐	☐	■	■
	UAS Technology & Applications	Core	■	■	■	■	■	■	■	■	■	☐	☐	■	■	■	■	■	■	■	■	■	■
	UAV Construction	Core	■	■	■	■	☐	■	■	■	■	■	☐	■	☐	■	■	■	■	■	■	■	■
	UAS Operations and the Law	Core	■	■	■	■	☐	■	■	■	■	■	☐	■	■	■	■	■	■	■	■	☐	■
	UAS Sensor Technology	Core	■	■	■	■	☐	■	■	☐	■	■	☐	■	☐	■	■	■	■	■	■	■	■
	Dissertation	Core	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

20 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.

21 Work based/placement learning statement

There are no placements on these programmes.

22 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.

For those students who wish to learn Welsh or to improve their Welsh, there are a range of courses available. Further, the Second Language Learning Centre can help those whose first language is not English. These services are found on Moodle at:

23 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.

Plagiarism
Where practicable, Turnitin will be used a tool to support students to develop their academic writing style as well as to detect plagiarism or collaboration.

Double Marking and Moderation
All module assessments will be internally verified with a sample being moderated by the external examiner in accordance with Glyndŵr University's Regulatory Requirements.

Extenuating Circumstances and Deadlines for Submission
Students will be given a schedule of assessment submission dates for the year. They will be informed of the penalties which apply for non-submission. Students will be made aware of the procedure relating to extenuating circumstances and will be encouraged to work closely with their tutors should they require support and guidance on this matter.

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 title	**Assessment type and weighting**	**Assessment loading**	**Indicative submission date**
Engineering Research Methods & PG Studies	*50% Report* *Critique based on a quantitative or qualitative research framework or methodology.* *50% Research Proposal* *Individual report and presentation relating to a proposed research strategy.*	*2,500 words* *2,500 words*	*Wks 16-21 Tri 1*
Sustainable Design & Innovation	*60% Presentation and Group Report* *40% Learning Logs/Journals*	*2,500 words* *1,500 words*	*Wks 10-20 Tri 1*
Engineering Systems Modelling & Simulation	*50% Coursework* *Report on solutions and discussions relating to computer modelling techniques.* *50% Coursework* *Report on the computer modelling of an engineering system*	*2,500 words* *2,500 words*	*Wks 20-25 Tri 1*

UAS Technology & Applications	*50% Coursework on UAS related technology and execution of a series of Flight Tests.* *50% Report* *Based on computerised UAS simulation or a critical investigation into UAS design for airworthiness*	*2,500 words* *2,500 words*	*Wks 20-25 Tri 1*
Advanced & Composite Materials	*50% Coursework* *A critique on the use of advanced composites.* *50% Examination* *On the principles, concepts and limitations of advanced composite materials.*	*2,500 words* *2 hours*	*Wks 17-20 Tri 1* *Wk 25*
Design With Composites	*Coursework 50%* *An FE based technical report.* *Examination 50%* *Into the effects of environmental conditions on polymeric composites.*	*2,500 words* *2 hours*	*Wk 38,42, Tri 2*
QA, Assembly and Repair of Composites	*Case Study 50%* *Based on practical industrial issues* *Examination 50%*	*2,500 words* *2 hours*	*Wk 38,42, Tri 2*
Advanced Automotive Chassis and Control	*Examination 100%* *Automotive Chassis Dynamics & Stability Theory*	*3 hours*	*Wk 42, Tri 2*
Advanced Engine Thermodynamics and Powertrain	*Examination 100%* *Automotive Internal Combustion and Electrical Powertrain* *Theory*	*3 hours*	*Wk 42, Tri 2*
UAV Construction	*50% Learning Logs/Journals relating to the design and build of a UAS.* *50% Practical* *Test-Flight of a UAS*	*2,500 words* *1 hour,* *1000 words*	*Wks, 27 -40, Tri 2*
UAS Operations and the Law	*Examination 50%* *50% Essay* *Critical evaluation of a realistic scenario relating to UAS payloads, telemetry and transmission systems*	*2 hrs* *2,500 words*	*Wk 33-34, & 40-42, Tri 2*

UAS Sensor Technology	*Examination 50%* *Based on sensor technology and theory.* *Essay 50%:* *A critical evaluation of an aspect of current sensor technology, research and advanced scholarship.*	*2 hours* *2,500 words*	*Wk 42, Tri 2* *Wk 36-37*
Dissertation	*10% Presentation* *90% Dissertation*	*20 mins* *15,000 words*	*Wk 4, Tri 3*

24 Assessment regulations

The regulations for Taught Masters programmes apply to these programmes.

Derogations

Two derogations from academic regulations are in place for these programmes:

- Students are required to achieve a minimum overall module mark of 50%, with each element of assessment (where there is more than one assessment) requiring a minimum mark of 40%.
- Students starting a Full time Masters programme in January shall complete the programme no more than 18 months after the approved commencement 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 normal registration period of 30 months.

Restrictions for trailing modules (for taught masters programmes only)

None

25 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 students 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 leaders

Mr. Martyn Jones (Composite Material Engineering)
Mr. Olivier Durieux (Automotive Engineering)
Mr. Robert Bolam (Unmanned Aircraft System Technology)

Programme team

Mr. David Sprake	Senior Lecturer (Sustainable Design Techniques)
Mr.Olivier Durieux	Principal Lecturer (Automotive Engineering)
Mr.Martyn Jones	Lecturer (Composite Materials & UAS Structural Design)
Mr. Nick Burdon	Lecturer (UAS Technology & Aerodynamics)
Mr. Bobby Manesh	Lecturer (Automotive Engineering)
Dr. Yuriy Vagapov	Reader (Dissertations, Research Methods & Electrical Technology)
Dr. Zheng Chen	Principal lecturer (System stability & control technology)
Dr. Fatima Mansour	Lecturer (Dissertations, Research Methods & Design Practice)
Mr.Shafiul Monir	Lecturer (Dissertations, Computer Modelling Techniques & Research Methods)

Mr. Andrew Sharp	Lecturer (Sensor Electronics and Microcontroller Technology)
Prof. Richard Day	Professor (Dissertations, Research & Composite Materials Technology)
Mrs. Nataliia Luhyna	Lecturer Composite Materials Technology
Mr.Robert Bolam	Senior Lecturer (UAS Technology & Operations)

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.

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

26 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

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 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.

27 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.