PROGRAMME SPECIFICATON

1	**Awarding body**	Glyndŵr University
2	**Teaching institution**	Glyndŵr University

3 **Award titles**

BEng (Hons) Aeronautical & Mechanical Engineering
BEng (Hons) Mechanical Manufacturing
BEng (Hons) Applied Product Design
BEng (Hons) Automotive Engineering
BEng (Hons) Drone Technology & Operations
BEng (Hons) Renewable and Sustainable Engineering
BEng (Hons) Electrical & Electronic Engineering
BEng (Hons) Automation Engineering
BEng (Hons) Optoelectronics & Holography
BEng (Hons) Aerospace and Modern Optics

The Specification includes Top-Up Programmes of:

BEng (Hons) Aircraft Maintenance
BEng (Hons) Composite Design

4 **Final awards available**

BEng (Hons) / Ord / Dip HE Aeronautical & Mechanical Engineering
BEng (Hons) / Ord / Dip HE Mechanical Manufacturing
BEng (Hons) / Ord / Dip HE Applied Product Design
BEng (Hons) ./Ord / Dip HE Automotive Engineering
BEng (Hons) / Ord / Dip HE Drone Technology & Operations
BEng (Hons) / Ord / Dip HE Renewable and Sustainable Engineering
BEng (Hons) / Ord / Dip HE Electrical & Electronic Engineering
BEng (Hons) / Ord / Dip HE Automation Engineering
BEng (Hons) / Ord / Dip HE Optoelectronics & Holography
BEng (Hons) / Ord / Dip HE Aerospace and Modern Optics

Cert HE Engineering (exit award for all above programmes)

BEng (Hons) Aircraft Maintenance
BEng (Hons) Composite Design

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 programmes will be accredited with effect from September 2017.

Accreditation available

Subject to the outcome of the EAB accreditation noted above, it is anticipated the programmes will count towards Engineering Council professional registration.

6 JACS3 **codes:**

BEng (Hons) Aeronautical & Mechanical Engineering	H410
BEng (Hons) Mechanical Manufacturing	H143
BEng (Hons) Applied Product Design	H150
BEng (Hons) Automotive Engineering	H330

BEng (Hons) Drone Technology & Operations	H460
BEng (Hons) Renewable and Sustainable Engineering	H221
BEng (Hons) Electrical & Electronic Engineering	H600
BEng (Hons) Automation Engineering	H661
BEng (Hons) Optoelectronics & Holography	H680
BEng (Hons) Aerospace and Modern Optics	H400
BEng (Hons) Aircraft Maintenance (L6 top up)	H410
BEng (Hons) Composite Design (L6 top up)	H900

7 **UCAS codes:**

BEng (Hons) Aeronautical & Mechanical Engineering	HH34
	HH4H (with Foundation Yr)
BEng (Hons) Mechanical Manufacturing	HH30
	H30H (with Foundation Yr)
BEng (Hons) Applied Product Design	L306
	P309 (with Foundation Yr)
BEng (Hons) Automotive Engineering	H431
	H331 (with Foundation Yr)
BEng (Hons) Drone Technology & Operations	A336
	A337 (with Foundation Yr)
BEng (Hons) Renewable and Sustainable Engineering	HH36
	HH3P (with Foundation Yr)
BEng (Hons) Electrical & Electronic Engineering	H600
	H602 (with Foundation Yr)
BEng (Hons) Automation Engineering	K311
	S322 (with Foundation Yr)
BEng (Hons) Optoelectronics & Holography	341H
	350B (with Foundation Yr)
BEng (Hons) Aerospace and Modern Optics	N232
	F258 (with Foundation Yr)
BEng (Hons) Aircraft Maintenance (L6 top up)	F301
BEng (Hons) Composite Design (L6 top up)	3Q82

8 **Relevant QAA subject benchmark statement/s**

QAA Subject Benchmark Statement Engineering (2015)
http://www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf

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)

10 **Mode of study** Full time

11 **Language of study** English

Office use only	
Validation Event:	28th November 2016
Approved:	21st February 2017

12 Criteria for admission to the programme

Applicants to the **three year Bachelor programmes** are required to have achieved 112 UCAS tariff points (280 prior to 2017) or equivalent.

For entry to either of the **Level 6 top-up programmes** - BEng (Hons) Composites Design or BEng (Hons) Aircraft Maintenance - applicants must have achieved a qualification at Level 5 or better in a relevant discipline. Entry to the programme may be gained by students who can present evidence listed below:

a. Have passed a Dip HE in a relevant discipline;
b. Have passed a French DUT;
c. Have achieved a minimum of 120 ECTS credits in a relevant discipline;
d. Have passed a Foundation Degree or HND in a cognate discipline;
e. Have passed a qualification from an EU or other overseas country equivalent, as defined as equivalent NARIC, to a DipHE or better in a relevant discipline.

Foundation Year entry criteria

The **three year Bachelors programmes** (Aeronautical and Mechanical Engineering, Mechanical Manufacturing, Automotive Engineering, Applied Product Design, Drone Technology & Operations, Renewable and Sustainable Engineering, Electrical and Electronic Engineering, Automation Engineering, Optoelectronics & Holography, Aerospace and Modern Optics) will also be offered as a four year kick-start degree (an introductory foundation year plus the three year degree programme). The kick-start will be offered where an applicant does not meet the entry requirements for the three year honours degree or where the department / applicants feel they would benefit from an additional year to gain some additional experience before progression to the full three year degree. Upon successful completion of foundation year the student will automatically progress to their chosen degree course (All courses can be studied except the two top up degrees). Entry to the four year kick-start programme will be conditional on interview and review of applications to confirm that students are able to satisfactorily complete the programme. The principal criteria for entry will be based on the academic judgement of the admissions tutor and members of the programme team in the relevant subject area.

The Foundation year route is aimed at:

- Those who do not meet the entry requirements for a full degree.
- Those who have been out of education for a while and feel they would benefit from the extra year of preparation.
- Those looking to undertake a degree in an entirely new subject area and do not have the subject specific experience necessary to go straight to a degree

International entry qualifications:

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

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 6.0 and no component below 5.5.

International students require a UKVI Approved Secure English Language Test (SELT), achieving an overall score of 6.0 with no component below 5.5 (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.

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

Other learning and experience may be considered for entry to the **three year Bachelor programmes**. 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.

Similarly, other relevant qualifications or a combination of relevant qualifications and industrial experience may be considered for entry onto either of the **Level 6 top-up programmes**.

The Admissions Tutors can advise further.

13 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.

Programme specific requirements

No RP(E)L is permitted for either of the two L6 top-up degrees.

14 Aim of the programmes

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

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

Thus, provides the breadth of learning, skills and attitudes for graduates to meet the future needs of a rapidly changing technology and business environment.

15 Distinctive features of the programmes

The Distinctive features for each programme is covered within the section specific to the individual programmes shown later.

16 Programme structure

The programmes will be delivered on a full time basis, with students being available for lectures across five days each week. The duration of the BEng (Hons) Degree programmes will normally be three years, which covers levels four, five and six on consecutive years. Each level consists of 120 credits, made up of 20 credit modules on the whole, with the exceptions of the level six projects (all) and level five group project (for some) which are 40 credits.

An exit award of Certificate of Higher Education in Engineering will be available for students who successfully complete 120 credits of the programme and who are unable or do not wish to continue with the programme. This would normally comprise 120 level four credits.

An exit award of a named Dip HE will available for students who successfully complete 240 credits of the named programme and who are unable or do not wish to continue with the programme.

An exit award of a named Ordinary Degree will be available for students who successfully complete 300 credits of the named programme and who are unable or do not wish to continue with the programme. The 300 credits would normally consist of 120 credits at L4, 120 credits at level 5 and 60 credits at level 6 (minimum).

The two top up degrees (Aircraft Maintenance and Composite Design) will only be awarded as honours degrees, on successful completion of the modules identified in the programme structures.

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

17 Programme structure diagrams

The following diagram shows all of the programmes in columns with modules in rows (overview). This demonstrates the commonality and distinctiveness of the grouping of the modules. This structure facilitates the streamlined and efficient delivery of common topics/modules whilst enabling the specialisms of the programmes to be delivered to the relevant groups. Modules will, in the main, be delivered across two semesters.

The following diagrams, in this section, show the same information presented as matrices, where ‘C’ denotes core and ‘O’ as option. Finally, in this section, a table indicating staff, module credits, core/option etc. is shown. Further grids, with further information can be found in the specific programmes sections shown later.

<table>
<tr><th>BEng (Hons) Aeronautical & Mechanical Engineering</th><th>BEng (Hons) Aircraft Maintenance (L6 Top-up)</th><th>BEng (Hons) Composite Design (L6 Top-up)</th><th>BEng (Hons) Mechanical Manufacturing</th><th>BEng (Hons) Applied Product Design</th><th>BEng (Hons) Automotive Engineering</th><th>BEng (Hons) Drone Technology & Operations</th><th>BEng (Hons) Renewable & Sustainable Engineering</th><th>BEng (Hons) Electrical & Electronic Engineering (see prog structure later in doc for possible option combinations)</th><th>BEng (Hons) Automation Engineering</th><th>BEng (Hons) Optoelectronics & Holography</th><th>BEng (Hons) Aerospace and Modern Optics</th></tr>
<tr><td colspan="12">Year 1 (Level 4)</td></tr>
<tr><td colspan="12">ENG461
Engineering Maths</td></tr>
<tr><td colspan="12">ENG458
Mechanical Science</td></tr>
<tr><td colspan="12">ENG459
Electrical Science</td></tr>
<tr><td colspan="12">ENG417
Engineering Design Practice</td></tr>
<tr><td colspan="7">ENG419
Materials & Manufacturing</td><td>ENG477
Sustainable Design</td><td colspan="2">ENG467
Analogue & Digital Electronics</td><td>ENG412
Transducers</td><td colspan="2">ENG478
Physics of Light</td></tr>
<tr><td colspan="3">ENG479
Aircraft Technology</td><td>ENG413
Application of Mechanical Systems</td><td>ENG477
Sustainable Design</td><td>ENG480
Automotive System</td><td>ENG481
Drone Technology & Operations</td><td colspan="4">ENG483
Energy Systems & Sustainability</td><td>ENG467
Analogue & Digital Electronics</td><td>ENG419
Materials & Manufacturing</td></tr>
<tr><td colspan="12">Year 2 (Level 5)</td></tr>
<tr><td colspan="4">ENG537
Further Eng Maths</td><td>ENG554
Production & Manufacturing Strategy</td><td colspan="7">ENG537
Further Eng Maths</td></tr>
<tr><td colspan="12">ENG52F
Business, Research & Professional Development</td></tr>
<tr><td colspan="7">ENG5XX
Eng Mechanics & Design</td><td>ENG565
Electrical Power Eng</td><td>(O) ENG565
Electrical Power Eng</td><td>(O) ENG563
Applied Analogue and Digital Electronics</td><td>ENG52H
Robotics</td><td>ENG52P
Fibre Optics</td><td>ENG52G
Eng Mechanics & Design</td></tr>
<tr><td colspan="6">ENG52J
Structures Analysis</td><td>ENG52K
Embedded Systems</td><td>ENG52J
Structures Analysis</td><td>(O) ENG564
Electrical Machines</td><td>(O) ENG52K
Embedded Systems</td><td>ENG564
Electrical Machines</td><td>ENG52K
Embedded Systems</td><td>ENG52J
Structures Analysis</td></tr>
<tr><td colspan="3" rowspan="2">ENG547
Avionics, Flight Dynamics & Control</td><td>ENG554
Production & Manufacturing Strategy</td><td rowspan="2">ENG52L
Product Design Project
(40 credit)</td><td>ENG52M
Internal Combustion Engine Systems</td><td rowspan="2">ENG52N
Drone Design & Construction
(40 credit)</td><td rowspan="2">ENG52Q
Renewable Energy Engineering
(40 Credits)</td><td colspan="3">ENG52R
Instrumentation and Control</td><td rowspan="2">ENG52T
Holography Project
(40 credit)</td><td rowspan="2">ENG52U
Optomechanical Project
(40 credit)</td></tr>
<tr><td colspan="3">ENG538
Thermo Fluids & Propulsion</td><td>ENG52H
Robotics</td><td>ENG557
Automotive Design</td><td colspan="3">ENG52B
PLCs</td></tr>
<tr><td colspan="12">Year 3 (Level 6)</td></tr>
<tr><td colspan="12">ENG684
Dissertation</td></tr>
<tr><td>ENG685
Engineering Modelling & Simulation</td><td>ENG686
Aircraft Maintenance Project</td><td colspan="10">ENG685
Engineering Modelling & Simulation</td></tr>
<tr><td colspan="2">ENG687
Aerodynamics</td><td colspan="3">ENG688
Design For X</td><td colspan="3">ENG687
Aerodynamics</td><td>ENG688
Design For X</td><td colspan="2">ENG60C
Electronics, Design & Testing</td><td>ENG667
Maintenance & Safety Systems</td><td colspan="2">ENG689
UAV Sensor Technology</td></tr>
<tr><td colspan="2">ENG690
Structural Vibration</td><td colspan="3">ENG691
Composite Materials</td><td colspan="2">ENG692
Automotive Dynamics and Powertrain Analysis</td><td>ENG693
Advanced UAV Operations</td><td>ENG694
Advanced Renewable Technology</td><td colspan="2">ENG696
Further Control Engineering</td><td>ENG645
Power Electronics and Electric Drives</td><td colspan="2">ENG697
Optical Microwave Technology</td></tr>
<tr><td>(O) ENG698
Aircraft Stability Control & Design</td><td rowspan="3">ENG699
Aircraft Maintenance Planning</td><td rowspan="3">ENG60A
Composite Design & Manufacture</td><td>(O) ENG690
Structural Vibration</td><td rowspan="3">ENG60B
Product Design Management</td><td>(O) ENG690
Structural Vibration</td><td rowspan="3">ENG689
UAV Sensor Technology</td><td rowspan="3">ENG691
Composite Materials</td><td rowspan="3">(O) ENG645
Power Electronics and Electric Drives</td><td rowspan="3">(O) ENG663
Industrial Communication Systems</td><td colspan="2" rowspan="3">ENG663
Industrial Communications Systems</td><td>(O) ENG690
Structural Vibration</td></tr>
<tr><td>(O) ENG616
Advanced Thermo-fluid & Turbomachinery</td><td rowspan="2">(O) ENG667
Maintenance & Safety Systems</td><td rowspan="2">(O) ENG691
Composite Materials</td><td rowspan="2">(O) ENG687
Aerodynamics</td></tr>
<tr><td>(O) ENG691
Composite Materials</td></tr>
</table>

Engineering Programmes Common/Specific Module Matrix – Year 1 (Level 4)

Module/Program	BEng Aeronautical & Mechanical Engineering	BEng Aircraft Maintenance (Top-up)	BEng Composite Design (Top-up)	BEng Mechanical Manufacturing	BEng Applied Product Design	BEng Automotive Engineering	BEng Drone Technology & Operations	BEng Renewable & Sustainable Engineering	BEng Electrical & Electronic Engineering	BEng Automation Engineering	BEng Optoelectronics & Holography	BEng Aerospace & Modern Optics
ENG461 Engineering Maths	**C**			**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**
ENG458 Mechanical Science	**C**			**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**
ENG459 Electrical Science	**C**			**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**
ENG417 Engineering Design Practice	**C**			**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**
ENG419 Materials & Manufacturing	**C**			**C**	**C**	**C**	**C**					**C**
ENG479 Aircraft Technology	**C**											
ENG413 Application of Mechanical Systems				**C**								
ENG477 Sustainable Design					**C**			**C**				
ENG480 Automotive Systems						**C**						
ENG481 Drone Technology & Operations							**C**					
ENG483 Energy Systems & Sustainability								**C**	**C**	**C**		
ENG467 Analogue & Digital Electronics									**C**		**C**	
ENG412 Transducers										**C**		
ENG478 Physics of Light											**C**	**C**

Engineering Programmes Common/Specific Module Matrix – Year 2 (Level 5)

Module/Program	BEng Aeronautical & Mechanical Engineering	BEng Aircraft Maintenance (Top-up)	BEng Composite Design (Top-up)	BEng Mechanical Manufacturing	BEng Applied Product Design	BEng Automotive Engineering	BEng Drone Technology & Operations	BEng Renewable & Sustainable Engineering	BEng Electrical & Electronic Engineering	BEng Automation Engineering	BEng Optoelectronics & Holography	BEng Aerospace & Modern Optics
ENG52F Business, Research & Professional Development	**C**			**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**
ENG537 Further Engineering Maths	**C**			**C**		**C**	**C**	**C**	**C**	**C**	**C**	**C**
ENG52G Engineering Mechanics & Design	**C**			**C**	**C**	**C**	**C**					**C**
ENG554 Production & Manufacturing Strategy				**C**	**C**							
ENG52J Structures Analysis	**C**			**C**	**C**	**C**		**C**				**C**
ENG547 Avionics, Flight Dynamics & Control	**C**											
ENG52N Drone Design & Construction (40 credits)							**C**					
ENG52Q Renewable Energy Engineering (40 credits)								**C**				
ENG538 Thermo Fluids & Propulsion	**C**											
ENG565 Electrical Power Engineering								**C**	**O**			
ENG564 Electrical Machines									**O**	**C**		
ENG52R Instrumentation and Control									**C**	**C**		

Module/Program	BEng Aeronautical & Mechanical Engineering	BEng Aircraft Maintenance (Top-up)	BEng Composite Design (Top-up)	BEng Mechanical Manufacturing	BEng Applied Product Design	BEng Automotive Engineering	BEng Drone Technology & Operations	BEng Renewable & Sustainable Engineering	BEng Electrical & Electronic Engineering	BEng Automation Engineering	BEng Optoelectronics & Holography	BEng Aerospace & Modern Optics
ENG52B PLCs									**C**	**C**		
ENG563 Applied Analogue and Digital Electronics									**O**			
ENG52K Embedded Systems							**C**		**O**		**C**	
ENG52T Holography Project (40 credits)											**C**	
ENG52U Optomechanical Project (40 credits)												**C**
ENG52P Fibre Optics											**C**	
ENG52H Robotics				**C**						**C**		
ENG52L Product Design Project (40 Credits)					**C**							
ENG52M Internal Combustion Engine Systems						**C**						
ENG557 Automotive Design						**C**						

Engineering Programmes Common/Specific Module Matrix – Year 3 (Level 6)

Module/Program	BEng Aeronautical & Mechanical Engineering	BEng Aircraft Maintenance (Top-up)	BEng Composite Design (Top-up)	BEng Mechanical Manufacturing	BEng Applied Product Design	BEng Automotive Engineering	BEng Drone Technology & Operations	BEng Renewable & Sustainable Engineering	BEng Electrical & Electronic Engineering	BEng Automation Engineering	BEng Optoelectronics & Holography	BEng Aerospace & Modern Optics
ENG684 Dissertation	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**
ENG685 Engineering Modelling & Simulation	**C**		**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**	**C**
ENG687 Aerodynamics	**C**	**C**				**C**	**C**					**O**
ENG690 Structural Vibration	**C**	**C**		**O**		**O**						**O**
ENG60C Electronics, Design & Testing									**C**			
ENG698 Aircraft Stability Control & Design	**O**											
ENG689 UAV Sensor Technology							**C**				**C**	**C**
ENG693 Advanced UAV Operations							**C**					
ENG616 Advanced Thermo-fluid & Turbomachinery	**O**											
ENG691 Composite Materials	**O**		**C**	**C**	**C**	**O**		**C**				
ENG688 Design For X			**C**	**C**	**C**			**C**				

Module/Program	BEng Aeronautical & Mechanical Engineering	BEng Aircraft Maintenance (Top-up)	BEng Composite Design (Top-up)	BEng Mechanical Manufacturing	BEng Applied Product Design	BEng Automotive Engineering	BEng Drone Technology & Operations	BEng Renewable & Sustainable Engineering	BEng Electrical & Electronic Engineering	BEng Automation Engineering	BEng Optoelectronics & Holography	BEng Aerospace & Modern Optics
ENG686 Aircraft Maintenance Project		**C**										
ENG699 Aircraft Maintenance Planning		**C**										
ENG667 Maintenance & Safety Systems				**O**						**C**		
ENG60A Composite Design & Manufacture			**C**									
ENG692 Automotive Dynamics & Powertrain Analysis						**C**						
ENG697 Optical Microwave Technology											**C**	**C**
ENG694 Advanced Renewable Technology								**C**				
ENG696 Further Control Engineering									**C**			
ENG60B Product Design Management					**C**							
ENG645 Power Electronics and Electric Drives									**O**	**C**		
ENG663 Industrial Communication Systems									**O**	**C**	**C**	

Programmes/Programme Leaders

Degree Programme	Programme Leader
BEng (Hons) Drone Technology and Operations	Rob Bolam
BEng (Hons) Aeronautical and Mechanical Engineering	Dr Zheng Chen
BEng (Hons) Aircraft Maintenance	Dr Zheng Chen
BEng (Hons) Automotive Engineering	Olivier Durieux
BEng (Hons) Electrical and Electronic Engineering	Brian Klaveness
BEng (Hons) Composite Design	Nataliia Luhyna
BEng (Hons) Automation Engineering	James Robinson
BEng (Hons) Renewable and Sustainable Engineering	David Sprake
BEng (Hons) Aerospace and Modern Optics	Dr Ardeshir Osanlou
BEng (Hons) Optoelectronics & Holography	Dr Ardeshir Osanlou
BEng (Hons) Applied Product Design	Dr Fatima Monsour
BEng (Hons) Mechanical Manufacturing	Dr Olaf Niestroj

Module/Module leaders

Code	Module Title	Module Leader	Credit
Level 4			
ENG461	Engineering Maths	Maria Kochneva	20
ENG458	Mechanical Science	Rob Bolam	20
ENG459	Electrical Science	Reg Holme	20
ENG417	Engineering Design Practice	Fatima Manour	20
ENG419	Materials & Manufacturing	Martyn Jones	20
ENG479	Aircraft Technology	Zheng Chen	20
ENG413	Application of Mechanical Systems	Bobby Manesh	20
ENG477	Sustainable Design	Fatima Mansour	20
ENG480	Automotive Systems	O.Durieux	20
ENG481	Drone Technology & Operations	Rob Bolam	20
ENG483	Energy Systems & Sustainability	David Sprake	20
ENG467	Analogue and Digital Electronics	Andrew Sharp	20
ENG412	Transducers	Reg Holme	20
ENG478	Physics of Light	Ardeshir Osanlou	20
Level 5			
ENG537	Further Engineering Maths	Brian Klaveness	20
ENG52F	Business, Research & Professional Development	Shafiul Monir	20
ENG52G	Engineering Mechanics & Design	Zheng Chen	20
ENG52J	Structures Analysis	Olaf Niestroj	20
ENG547	Avionics, Flight Dynamics & Control	Zheng Chen	20
ENG538	Thermo-fluids & Propulsion	Olaf Niestroj	20
ENG554	Production & Manufacturing Strategy	Nataalija Vidmer	20
ENG52H	Robotics	James Robinson	20
ENG52L	Product Design Project	Fatima Mansour	40
ENG52M	Internal Combustion Engine Systems	O.Durieux	20
ENG557	Automotive Design	Bobby Manesh	20
ENG52N	Drone Design & Construction	Rob Bolam	40

Code	Module Title	Module Leader	Credit
ENG52Q	Renewable Energy Engineering	David Sprake	40
ENG565	Electrical Power Engineering	Yuriy Vagapov	20
ENG564	Electrical Machines	Yuriy Vagapov	20
ENG52R	Instrumentation and Control	Reg Holme	20
ENG52B	PLCs	James Robinson	20
ENG563	Applied Analogue & Digital Electronics	Andy Sharp	20
ENG52K	Embedded Systems	Andy Sharp	20
ENG52T	Holography Project	Ardeshir Osanlou	40
ENG52U	Optomechanical Project	Ardeshir Osanlou	40
ENG52P	Fibre Optics	Ardeshir Osanlou	20
Level 6			
ENG684	Dissertation	Andy Sharp	40
ENG685	Engineering Modelling & Simulation	Shafiul Monir	20
ENG687	Aerodynamics	Xiaobing Huang	20
ENG690	Structural Vibration	Zheng Chen	20
ENG698	Aircraft Stability Control & Design	Zheng Chen	20
ENG616	Advanced Thermo-fluid & Turbomachinery	Xiaobing Huang	20
ENG691	Composite Materials	Nataliia Luhyna	20
ENG688	Design For X	Martyn Jones	20
ENG60B	Product Design Management	Fatima Mansour	20
ENG692	Automotive Dynamics and Powertrain Analysis	O.Durieux	20
ENG667	Maintenance and Safety Systems	F. Mansour	20
ENG693	Advanced UAV operations	Rob Bolam	20
ENG689	UAV Sensor Technology	Rob Bolam	20
ENG694	Advanced Renewable Technology	David Sprake	20
ENG60C	Electronics, Design & Testing	Brian Klaveness	20
ENG696	Further Control Engineering	Zheng Chen	20
ENG645	Power Electronics and Electric Drives	Yuriy Vagapov	20
ENG663	Industrial Communication Systems	James Robinson	20
ENG686	Aircraft Maintenance Project	Nick Burdon	20
ENG699	Aircraft Maintenance Planning	Nick Burdon	20
ENG60A	Composite Design & Manufacture	Nataliia Luhyna	20
ENG697*	Optical Microwave Technology	Ardeshir Osanlou	20

18 Intended learning outcomes of the programme

Generic learning outcomes associated with all programmes are listed below. **Please see individual programme entries at the end of this document for additional programme-specific learning outcomes.**

On completion of Level 4/5/6, students will be able to:

Knowledge and understanding				
	Level 4	Level 5	Level 6	Level 6 Honours Degree
A1	Develop an understanding of mathematical concepts or principles relevant to engineering	Apply mathematical concepts or principles relevant to engineering problems.	Model and analyse engineering systems using appropriate mathematical methods	Model and analyse complex engineering systems using appropriate mathematical methods, while recognising the limitations of such analysis
A2	Identify and explain scientific principles relevant to engineering	Develop scientific principles and demonstrate an understanding of relevant applications within engineering	Demonstrate a comprehensive knowledge and understanding of scientific principles and their use for modelling, analysis and design in engineering systems.	Demonstrate a wide knowledge and a comprehensive understanding of complex engineering systems and the ability to analyse and synthesise such engineering principles and systems
A3	Illustrate the design process and explain the applied methodology	Investigate the problem behind the design process and the applied methodology	Plan and manage the design process and methodology, and evaluate the outcomes.	Apply advanced problem solving skills and technical knowledge to all aspects of the design process and methodology. Demonstrate an awareness of operational, environmental and ethical implications, and the need for sustainable development
A4	Develop an awareness of current technologies and their uses within engineering	Critically appraise current and future technologies and develop an awareness of the sustainability implications.	Display an awareness of current issues and future prospects at the forefront of the discipline	Display a critical awareness of current issues and future prospects at the forefront of the discipline

Intellectual skills				
	Level 4	Level 5	Level 6	Level 6 Honours Degree
B1	Identify problems and potential causes and effects	Identify and analyse problems and use diagnostic methods to recognise causes and achieve satisfactory solutions	Apply engineering principles to the solution of design and operation problems	Innovate in solving novel and challenging problems and be aware of the limitations of the solutions
B2	Identify, organise and use resources to complete tasks safely and efficiently	Identify, organise and use resources effectively to complete tasks, with consideration for cost, quality, safety and environmental impact.	Assess the resources and techniques used to complete tasks appropriately, and to achieve engineering objectives. Demonstrate a strong understanding of the legal requirements, appropriate ethical conduct and associated risks that may occur before, during and after the task has been completed.	Critically assess the resources and techniques used to complete tasks, and to achieve engineering objectives. Recommend new techniques or use of resources based on a strong understanding of legal requirements, appropriate ethical conduct and associated risks that may occur before, during and after the task has been completed.
B3	Apply given tools/ methods to a well-defined problem and begin to appreciate the complexity of the issues.	Recognise and define key elements of problems and choose appropriate methods for their resolution in a considered manner.	Critically appraise engineering problems. Generate and analyse data to solve engineering problems	Critically appraise engineering problems. Generate and analyse data to solve complex engineering problems
B4	Form opinions based upon knowledge and understanding of the subject in question	Present arguments to uphold decisions following an evaluation of a particular subject.	Assess, interpret and implement decisions with an awareness of technical, economic and commercial implications	Assess, interpret and implement decisions with a critical awareness of technical, economic and commercial implications

Subject skills				
	Level 4	Level 5	Level 6	Level 6 Honours Degree
C1	Conduct given laboratory experiments to investigate engineering principles and properties of devices and systems	Devise laboratory experiments to prove engineering principles and properties of devices and systems	Conduct and analyse experiments, adapting experimental procedures to novel situations if necessary, analysing experimental data, and drawing conclusions	Conduct and analyse experiments, adapting experimental procedures to novel situations if necessary, analysing experimental data in detail, and drawing comprehensive conclusions
C2	Design and construct devices and systems to meet given performance criteria	Design and construct devices/systems and devise methods of testing to check for given performance criteria	Design, construct and test devices and systems to meet given performance criteria, including the use of computer-based tools where appropriate	Design, construct, test and evaluate devices and systems to meet given performance criteria, including the use of computer-based tools
C3	Monitor processes or systems, and develop an awareness of possible improvements.	Monitor processes or systems, trend processes and make predictions, in order to bring about continuous improvement.	Extract and evaluate information relating to trends and processes to make predictions, in order to solve engineering problems	Analyse and evaluate processes, techniques or systems relating to unfamiliar problems with an awareness of quality issues and their application to continuous improvement
C4	Propose and plan a self-directed individual programme of investigation.	Plan, undertake and report a self-directed individual programme of investigation and design.	Plan and carry out a personal programme of work	Propose, plan, undertake and report a self-directed individual programme of investigation, design and implementation

Professional and Employability Skills				
	Level 4	Level 5	Level 6	Level 6 Honours Degree
D1	Use oral, written and electronic methods for the communication of technical and other information	Use oral, written and electronic methods for competent communication of technical and other information	Communicate the application of methods, and the identification of patterns and results efficiently through written and verbal communication.	Identify problems, bias and recommendations effectively through graphical, written and verbal forms of communication.
D2	Identify basic information and suitable sources, carry out searches and bring information together in a way that ensures work is accurate, clear and properly saved.	Plan how to obtain and use required information for the purpose of an activity and use appropriate structures and procedures to explore and develop information.	Optimise use of resources and time in project planning and implementation	Use information technology competently - to source information, to prepare reports, to model performance using specialised software packages
D3	Work reliably without close supervision accepting responsibility for tasks undertaken	Demonstrate the ability to work reliably and effectively without supervision accepting responsibility for tasks undertaken	Learn independently and be familiar with how to access key information	Evaluate and reflect on own performance and self-management
D4	Use CPD to maintain competence and reflective practice	Make effective use of CPD to ensure ongoing competence at the level of future intended practice.	Demonstrate the practical skills of independent planning and execution of projects which relate to relevant engineering discipline.	Interpret the role of the engineer as a manager of himself/herself and of others, ensuring the highest level of professional and ethical conduct and acting within the legal framework governing engineering activities

19 Curriculum Matrix

Curriculum Matrix demonstrating how the overall programme outcomes are achieved and where skills are developed within individual modules

Module / Outcome	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Level 4																
ENG461 Engineering Maths	✓		✓										✓		✓	
ENG458 Mechanical Science	✓	✓					✓	✓	✓		✓		✓	✓		
ENG459 Electrical Science	✓	✓					✓	✓	✓		✓		✓	✓		
ENG417 Engineering Design Practice		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓
ENG419 Materials & Manufacturing		✓		✓	✓	✓		✓	✓	✓				✓	✓	
ENG477 Sustainable Design			✓	✓	✓			✓	✓					✓	✓	
ENG467 Analogue & Digital Electronics		✓				✓	✓		✓		✓			✓	✓	
ENG412 Transducers	✓	✓				✓	✓		✓		✓				✓	
ENG478 Physics of Light	✓	✓				✓			✓							
ENG479 Aircraft Technology			✓	✓		✓		✓	✓	✓				✓	✓	
ENG413 Application of Mechanical Systems	✓	✓		✓	✓	✓		✓	✓		✓			✓	✓	
ENG480 Automotive Systems			✓	✓	✓	✓		✓	✓	✓	✓			✓	✓	
ENG481 Drone Technology & Operations		✓		✓	✓		✓	✓	✓		✓			✓		
ENG483 Energy Systems & Sustainability		✓		✓	✓		✓	✓	✓					✓		

Module / Outcome	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
Level 5																
ENG537 Further Engineering Maths	✓		✓										✓		✓	
ENG554 Production & Manufacturing Strategy			✓	✓		✓	✓	✓					✓	✓		✓
ENG52F Business, Research and Professional Development						✓	✓	✓					✓	✓		✓
ENG52G Engineering Mechanics & Design	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	
ENG565 Electrical Power Engineering	✓	✓			✓				✓					✓		
ENG563 Applied Analogue and Digital Electronics	✓	✓			✓		✓		✓		✓			✓		
ENG52H Robotics	✓	✓		✓	✓				✓		✓					
ENG52P Fibre Optics	✓	✓		✓					✓		✓					
ENG52J Structures Analysis	✓	✓			✓		✓		✓				✓	✓		
ENG52K Embedded Systems	✓	✓		✓	✓		✓		✓		✓		✓	✓		
ENG564 Electrical Machines	✓	✓		✓	✓				✓		✓		✓	✓		
ENG547 Avionics, Flight Dynamics & Control	✓	✓		✓	✓		✓		✓		✓					
ENG52L Product Design Project (40 credit)		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
ENG52M Internal Combustion Engine Systems	✓	✓		✓	✓				✓		✓		✓	✓		
ENG52N Drone Design & Construction		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Module / Outcome	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
ENG52Q Renewable Energy Engineering	✓	✓		✓	✓				✓				✓			
ENG52R Instrumentation and Control	✓	✓		✓	✓				✓							
ENG52T Holography Project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
ENG52U Optomechanical Project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
ENG538 Thermo Fluids & Propulsion	✓	✓							✓							
ENG557 Automotive Design		✓	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	
ENG52B PLCs		✓		✓	✓				✓	✓	✓		✓			
Level 6																
ENG684 Dissertation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ENG685 Engineering Modelling & Simulation	✓	✓			✓		✓		✓	✓	✓		✓	✓		
ENG686 Aircraft Maintenance Project		✓				✓	✓						✓		✓	
ENG687 Aerodynamics	✓				✓				✓				✓			
ENG688 Design For X		✓	✓		✓	✓	✓	✓	✓				✓	✓	✓	
ENG60C Electronics, Design & Testing		✓					✓	✓	✓	✓			✓			
ENG667 Maintenance & Safety Systems		✓					✓	✓					✓	✓		
ENG690 Structural Vibration	✓						✓									
ENG691 Composite Materials		✓		✓	✓		✓	✓								
ENG692 Automotive Dynamics & Powertrain Analysis	✓	✓		✓	✓	✓	✓							✓		

Module / Outcome	A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2	D3	D4
ENG693 Advanced UAV Operations		✓		✓			✓						✓	✓		
ENG694 Advanced Renewable Technology		✓		✓	✓		✓						✓			
ENG696 Further Control Engineering	✓	✓	✓	✓			✓							✓		
ENG645 Power Electronics and Electric Drives	✓	✓	✓	✓	✓		✓		✓		✓			✓		
ENG697 Optical Microwave Technology	✓	✓		✓	✓		✓	✓	✓							
ENG698 Aircraft Stability Control & Design	✓	✓					✓									
ENG699 Aircraft Maintenance Planning			✓	✓		✓							✓			
ENG60A Composite Design & Manufacture		✓		✓	✓		✓	✓					✓			
ENG60B Product Design Management			✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	
ENG689 UAV Sensor Technology	✓			✓			✓									
ENG663 Industrial Communication Systems	✓	✓		✓	✓		✓	✓	✓		✓		✓	✓		
ENG616 Advanced Thermo-fluid & Turbomachinery	✓	✓		✓			✓									

20 Learning and teaching strategy

The learning and teaching strategy has been developed within Glyndŵr University's Teaching and Learning Framework, and has been informed by the QAA Subject Benchmark statement for Engineering (2015) and the QCA (Qualifications and Curriculum Authority).

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 practice.

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 / lecture 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 QCA /QAA 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 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), 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 relating to any of the programmes within this suite.

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:

https://moodle.glyndwr.ac.uk/course/view.php?id=23%252F%2522%2520target%253D%2522_blank%2522

23 Assessment strategy

The programme team are committed to delivering an assessment strategy which is student centred, and reflects the requirements of the QAA Subject Benchmark Statement Engineering (2015).

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.

There is a commitment to enable students to focus on their own learning needs and to use assessment as a means for evaluating their own practice, analysing their organisational practice and where possible to synthesise work based learning and University learning.

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.

Grading
Assessment will be graded using the suggested criteria grid detailed within Glyndŵr University's Assessment Guidance Handbook, the criteria will be contextualised for each assessment. All work will be assessed by tutors at Glyndŵr University. Students will receive written feedback within the target times set out by Glyndŵr University.

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

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 a portfolio; 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.

Assessment Methods

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.

In Course Tests

In course tests are usually an 'unseen' paper sat in an invigilated environment. An exception to the unseen element is when a case study is required for reference. Indicative feedback of results will be provided to students within three weeks of the submission date. Official results will be provided in the form of a transcript after assessment boards have been convened.

Note: The in-course tests will be set in a similar style to a formal written examination, with a similar type of paper and with a similar level of academic rigour. However, it will be sat under the supervision of the programme team, rather than under the central university administration, in order to provide flexibility in the timing of the assessment activity.

Assignment

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.

Schedule of Assessments

The following tables give an overview of the methods by which each module is assessed. Further details of assessments can be found in the module specifications.

Schedule of Assessments – Level 4

Module	Credits	In Course [%]	Written Exam [%]	Duration [Hrs]	Trimester
ENG461 Engineering Maths	20	-	100	2 (x2)	1 & 2
ENG458 Mechanical Science	20	50	50	90 mins	1 & 2
ENG459 Electrical Science	20	50	50	2	1 & 2
ENG417 Engineering Design Practice	20	100	-	-	1 & 2
ENG419 Materials & Manufacturing	20	50	50	2	1 & 2
ENG479 Aircraft Technology	20	100	-	-	1 & 2
ENG413 Application of Mechanical Systems	20	100	-	-	1 & 2
ENG477 Sustainable Design	20	100	-	-	1 & 2
ENG480 Automotive Systems	20	100	-	-	1 & 2
ENG481 Drone Technology & Operations	20	100	-	-	1 & 2
ENG483 Energy Systems & Sustainability	20	50	50	2	1 & 2
ENG467 Analogue & Digital Electronics	20	100	-	-	1 & 2
ENG412 Transducers	20	60	40	1	1 & 2
ENG478 Physics of Light	20	100			1 & 2

Schedule of Assessments – Level 5

Module	Credits	In Course [%]	Written Exam [%]	Duration [Hrs]	Trimester
ENG537 Further Eng Maths	20	-	100	2 (x2)	1 & 2
ENG52F Business, Research and Professional Development	20	100	-	-	1 & 2
ENG52G Eng Mechanics & Design	20	50	50	2	1 & 2
ENG52J Structures Analysis	20	40	60	2	1 & 2
ENG547 Avionics, Flight Dynamics and Control	20	50	50	2	1 & 2
ENG538 Thermo Fluids & Propulsion	20	30	70	2	1 & 2
ENG554 Production & Manufacturing Strategy	20	40	60	2	1 & 2
ENG52H Robotics	20	50	50	2	1 & 2
ENG52L Product Design Project	40	100	-	-	1 & 2
ENG52M Internal Combustion Engine Systems	20	50	50	2	1 & 2
ENG557 Automotive Design	20	100	-	-	1 & 2
ENG52N Drone Design & Construction	40	100	-	-	1 & 2
ENG52Q Renewable Energy Engineering	20	100	-	-	1 & 2
ENG565 Electrical Power Engineering	20	40	60	2	1 & 2
ENG564 Electrical Machines	20	40	60	2	1 & 2
ENG52R Instrumentation and Control	20	50	50	2	1 & 2
ENG52B PLCs	20	100	-	-	1 & 2
ENG563 Applied Analogue and Digital Electronics	20	100	-	-	1 & 2
ENG52K Embedded Systems	20	100	-	-	1 & 2
ENG52T Holography Project	40	100	-	-	1 & 2
ENG52U Optomechanical Project	40	100	-	-	1 & 2
ENG52P Fibre Optics	20	100	-	-	1 & 2

Schedule of Assessments – Level 6

Module	Credits	In Course [%]	Written Exam [%]	Duration [Hrs]	Trimester
ENG684 Dissertation	40	100	-	-	1 & 2
ENG685 Engineering Modelling & Simulation	20	100	-	-	1 or 2
ENG687 Aerodynamics	20	40	60	2	1 or 2
ENG690 Structural Vibration	20	-	100	3	1 or 2
ENG698 Aircraft Stability Control & Design	20	-	100	3	1 or 2
ENG616 Advanced Thermo-fluid & Turbomachinery	20	-	100	3	1 or 2
ENG691 Composite Materials	20	40	60	2	1 or 2
ENG688 Design For X	20	100	-	-	1 or 2
ENG60B Product Design Management	20	100	-	-	1 or 2
ENG692 Automotive Dynamics and Powertrain Analysis	20	100	-	-	1 or 2
ENG667 Maintenance and Safety Systems	20	100	-	-	1 or 2
ENG693 Advanced UAV Operations	20	100	-	-	1 or 2
ENG689 UAV Sensor Technology	20	40	60	2	1 or 2
ENG689 Advanced Renewable Technology	20		100	3	1 or 2
ENG60C Electronics, Design & Testing	20	50	50	2	1 & 2
ENG696 Further Control Engineering	20	50	50	2	1 or 2
ENG645 Power electronics and Electric Drives	20	-	100	3	1 & 2
ENG663 Industrial Communication Systems	20	100	-	-	1 or 2
ENG686 Aircraft Maintenance Project	20	100	-	-	1 or 2
ENG699 Aircraft Maintenance Planning	20	100	-	-	1 or 2
ENG60A Composite Design & Manufacture	40	50	50	2	1 or 2
ENG697 Optical Microwave Technology	20	50	50	2	1 or 2

24 Assessment regulations

Regulations for Bachelor Degrees, Diplomas, Certificates and Foundation Degrees apply to these programmes.

Derogations

A derogation from academic regulations has been approved for these programmes which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Non-credit bearing assessment

N/A

Borderline classifications (for undergraduate programmes only)

The Level Six Dissertation will be taken into consideration when considering borderline classifications, alongside all other criteria is described in the Academic Regulations.

Restrictions for trailing modules (for taught masters programmes only)

N/A

25 Programme Management

Programme team (see section 17 for identification of individual programme leaders)

Andrew Sharp
Ardeshir Osanlou
Bobby Manesh
Brian Klaveness
David Sprake
Fatima Mansour
James Robinson
Maria Kochneva
Martyn Jones
Nataliia Luhyna
Natalija Vidmer
Nick Burdon
Olaf Niestroj
Olivier Durieux
Phil Youens
Reg Holme
Robert Bolam
Shafiul Monir
Tecwyn Mitchell
Xiaobing Huang
Yuriy Vagapov

Quality management The Programme Leader will take overall responsibility for quality assurance and enhancement in line with the expectations detailed within the University's Programme Leaders Handbook.

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, professional bodies, external examiners and employers. 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. Specific methods used for consulting students include the completion of Module Evaluation Questionnaires, Student Voice Forum and end of year group feedback sessions.

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.

Industrial Meetings
Regular meetings take place with industry's training managers, chief engineers, factory/site managers and regional managers. This gives an opportunity for their current and future training needs to be discussed and developed. Regular site visits are undertaken in the context of the School's part time students, however this also contributes to our full time provision.

Open Door Policy
Staff operate 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, 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 photovoltaics 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)

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 are 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 visits
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 support for students, such 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 will be provided with a personal tutor and will have opportunities to discuss opportunities for personal development planning.

Programme specific support for students

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

- 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.
vii. Each programme of study 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 policy on Equality and Diversity, ensuring that everyone who has the potential to achieve in higher education is given the chance to do so, irrespective of age, gender, disability, sexuality, race or social background.

Programme Specific Information

BEng (Hons) Aeronautical & Mechanical Engineering

JACS3 Code: H410

Distinctive features of the programme

The programme aims to produce graduates with knowledge, understanding and skills of aeronautical and mechanical engineering-based subjects and their applications in aeronautical and mechanical industries, and to provide the breadth and depth of learning, skills and attitudes for graduates to meet the future needs of a rapidly changing technology and business environment. The graduates will be equipped with analytical, computational, design and transferable skills, and including an awareness of social and environmental implications, will be able to play leading professional roles in aeronautical and mechanical engineering and related industries, to show initiative, to take responsibility and to make decisions in complex and unpredictable situations.

Career opportunities are wide ranging and the present shortage of practising engineers in the fields of aeronautical, mechanical, and manufacturing engineering which should lead to an increased demand from industry in future years. Students on these programmes in the past have been successful in seeking employment as engineering personnel with renown organisations such as Airbus, British Airways, Jaguar Cars Ltd, J C Bamford Excavators Limited (JCB), Kellogg's Co. of Great Britain Ltd, Kronospan Ltd, Rolls Royce plc, Siemens, Toyota Motor Manufacturing Ltd, to name a few.

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Aeronautical & Mechanical Engineering will also:

	Level 4	**Level 5**	**Level 6 (Ord)**	**Level 6 (Hons)**
A5	Develop an awareness of modern aircraft technologies and identify scientific principles relevant to the advances in modern aircraft.	Develop an understanding on the scientific principles governing the design and analysis of aircraft structure, dynamics and control.	Demonstrate an overall understanding on the design and analysis theories and technologies for modern aircraft structural, dynamics, and control systems design.	Demonstrate a comprehensive knowledge on modern aircraft design and analysis technologies, and an in-depth understanding on aerodynamics, flight mechanics, flight stability and control, and structural analysis.
C5	Perform data acquisition and conduct investigation on modern aircraft technology applications.	Conduct structural strength and dynamic stability analyses in a modern aircraft design process.	Systematically plan and carry out aircraft structural, dynamic, stability, and control analysis and design.	Deal with the issues of complex aircraft structural, dynamic and control design and analysis systematically and creatively, and make sound engineering judgements.

Module Grid for BEng (Hons) Aeronautical & Mechanical Engineering

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG537** Further Engineering Maths *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG52G** Engineering Mechanics & Design *Core Module* *20 Credits*	**ENG687** Aerodynamics *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG52J** Structures Analysis *Core Module* *20 Credits*	**ENG690** Structural Vibration *Core Module* *20 Credits*
ENG419 Materials & Manufacturing *Core Module* *20 Credits*	**ENG547** Avionics, Flight Dynamics &Control *Core Module* *20 Credits*	**ENG698** Aircraft Stability Control & Design *Optional Module* *20 Credits*
ENG479 Aircraft Technology *Core Module* *20 Credits*	**ENG538** Thermo Fluids & Propulsion *Core Module* *20 Credits*	**ENG616** Advanced Thermo-fluid & Turbomachinery *Optional Module* *20 Credits*
		ENG691 Composite Materials *Optional Module* *20 Credits*

Optional modules are only available in level 6, all optional modules are a core module from an alternative engineering programme.

BEng (Hons) Mechanical Manufacturing

JACS3 Code: H143

Distinctive features of the programme

Here at Glyndŵr University, we aim to ensure that the *BEng in Mechanical Manufacturing* comprises fit-for-purpose teaching and a research experience which provides a solid background for a career in the engineering and manufacturing industry sector.

Lecturers are leaders in their fields with extensive industrial experience. Many of them are recognized by the IMechE. Glyndwr University is equipped with up-to-date teaching facilities including manufacturing facilities for CNC machining, 3D printing or programme specific labs. The programme provides the opportunity to combine practical aspects of day-to-day engineering 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 engineering career paths taking on key roles in industry and public services.

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Mechanical Manufacturing will also

	Level 4 Cert HE	Level 5 Dip HE	Level 6 Degree	Level 6 Honours Degree
A5	be able to demonstrate knowledge of different types of materials and their impact on manufacturing.	be able to deepen their understanding of materials behaviour in combination with applied machine design.	be able to develop knowledge of principles of engineering design in the area of mechanical engineering.	be able to develop a comprehensive knowledge on modern mechanical engineering design and testing.
C5	be able to evaluate the different stages of the design process and will be able to apply these principles to machines and machine components	be able to demonstrate skills of effective design, modelling and performance analysing of basic structural systems to machines and robotic systems.	be able to deal with mechanical engineering solutions and make sound engineering judgment to solve related problems and/or to develop new design approaches.	be able to deal with the complex evaluation and finding solutions to mechanical engineering problems using various tools and techniques, incl. numerical simulation.

Module Grid for BEng (Hons) Mechanical Manufacturing

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG537** Further Engineering Maths *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG52G** Engineering Mechanics & Design *Core Module* *20 Credits*	**ENG688** Design For X *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG52J** Structures Analysis *Core Module* *20 Credits*	**ENG691** Composite Materials *Core Module* *20 Credits*
ENG419 Materials & Manufacturing *Core Module* *20 Credits*	**ENG554** Production & Manufacturing Strategy *Core Module* *20 Credits*	**ENG690** Structural Vibration *Optional Module* *20 Credits*
ENG413 Application of Mechanical Systems *Core Module* *20 Credits*	**ENG52H** Robotics *Core Module* *20 Credits*	**ENG667** Maintenance & Safety Systems *Optional Module* *20 Credits*

Optional modules are only available in level 6, all optional modules are a core module from an alternative engineering programme.

BEng (Hons) Applied Product Design

JACS3 Code: H150

Distinctive features of the programme

Product design course aims to develop the student technical and creative abilities to produce innovative products that are both functional and commercially viable, meeting the needs of the consumer and manufacturer.

Product design focuses on development of students' skills to create new and innovative products from concept to manufacture. To develop those skills, the programme covers various human centred approaches to help students enhance their creative mind to generate ideas, evaluate them and then turn them into a new product. Examples are visualisation approaches, modelling methods, practical work, group discussion approach, projects, the use of specialist engineering software to support creative thinking, analytical analysis, problem-solving and rapid prototyping.

Students have the opportunity to gain knowledge and expertise from our cutting-edge research centre, from close industrial partner such as Toyota, Airbus, Rolls-Royce and Magellan and from academic staff who are leaders in their fields and have worked in industry. This course is accredited by the Institution of Engineering and Technology.

Students benefit from a dynamic and stimulating environment with state-of-the-art workshops and laboratories which include simulators, 3D printers, polishing machines, wind tunnel, laser cutter, CNC machine and many other machines.

Students develop *proficiency in industry standard software*. Our computer laboratories are equipped with a wide range of specialist engineering software to suit students' design needs Examples are ANSYS, Autodesk *Product Design Suite*, Navisworks, Autocad, Matlab, Scilab, Catia, Edgecam and graphical software such as Photoshop, Adobe Creative Suite. These software are highly regarded by employers thus making you more employable.

Students have the opportunity to present their work and demonstrate their skills in an annual design exhibition open to community, and publish their portfolio for viewing by industry representatives and designers. Students are also encouraged to enter national and international design competitions.

Career prospects:

Our graduates enjoy a high success rate in gaining employment after graduation, and our alumni form an important part of our industry network. Knowledge and skills gained during this course are highly regarded by employers thus making Graduates more employable. Graduates of this programme will have employment opportunities across a variety of sectors such as Mechanical, Aeronautics, Electrical and electronic engineering, defence, energy, consumer products, automotive and manufacturing.

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Applied Product Design will also

	Level 4	**Level 5**	**Level 6 (Ord)**	**Level 6 (Hons)**
A5	Develop an understanding of Engineering Design and Practice, Materials & Manufacturing, and Sustainable Design.	Develop technical and creative abilities to produce innovative products.	Apply knowledge and skills to real industrial challenges.	Apply knowledge and skills to real industrial challenges, demonstrate skills and build portfolio for career opportunities.
C5	Generate ideas, evaluate them and then turn them into a new product.	Develop creative abilities, design and presentation essential skills so Students are ready to work within product design industry.	Students develop proficiency in industry standard software. These software are highly regarded by employers thus making you more employable.	Develop proficiency in industry standard software. These software are highly regarded by employers thus making you more employable.

Module Grid for BEng(Hons) Applied Product Design

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52G** Engineering Mechanics & Design *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG52J** Structures Analysis *Core Module* *20 Credits*	**ENG688** Design For X *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG554** Production & Manufacturing Strategy *Core Module* *20 Credits*	**ENG691** Composite Materials *Core Module* *20 Credits*
ENG419 Materials & Manufacturing *Core Module* *20 Credits*	**ENG52L** Product Design Project *Core Module* *40 Credits*	**ENG60B** Product Design Management *Core Module* *20 Credits*
ENG477 Sustainable Design *Core Module* *20 Credits*		

BEng (Hons) Automotive Engineering

JACS3 Code: H330

Distinctive features of the programme

Glyndŵr University has a proven track of success in Automotive Engineering and Motorsport. The *BEng (Hons) Automotive Engineering course* contains 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 (track racing, car building), and the laboratories at Glyndŵr 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.

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Automotive Engineering will also

	Level 4	**Level 5**	**Level 6 (Ord)**	**Level 6 (Hons)**
A5	Demonstrate knowledge of the automotive specific field including car systems and workshop practice.	Deepen their understanding of automotive engineering. Be able to specify vehicle performance as well as internal combustion engines.	Model automotive powertrains and evaluate the key indicators of car stability and dynamics.	Develop a critical understanding of automotive engineering and solve complex problems pertaining to them.
C5	Demonstrate an understanding of automotive manufacture and the impact on the general design of a vehicle that powertrains have.	Design and implement automotive chassis and powertrains.	Manage information systems in a variety of types. Utilise a range of tools and techniques to develop a variety of automotive systems.	Research, develop, present and report the findings on an automotive specific field.

Module Grid for BEng (Hons) Automotive Engineering

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG537** Further Engineering Maths *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG52G** Engineering Mechanics & Design *Core Module* *20 Credits*	**ENG687** Aerodynamics *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG52J** Structures Analysis *Core Module* *20 Credits*	**ENG692** Automotive Dynamics & Powertrain Analysis *Core Module* *20 Credits*
ENG419 Materials & Manufacturing *Core Module* *20 Credits*	**ENG556** Internal Combustion Engine Systems *Core Module* *20 Credits*	**ENG690** Structural Vibration *Optional Module* *20 Credits*
ENG465 Automotive Systems *Core Module* *20 Credits*	**ENG557** Automotive Design *Core Module* *20 Credits*	**ENG691** Composite Materials *Optional Module* *20 Credits*

Optional modules are only available in level 6, all optional modules are a core module from an alternative engineering programme.

BEng (Hons) Drone Technology & Operations

JACS3 Code: H460

Distinctive features of the programme

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 billions of pounds over the next 20 years.

At Glyndŵr University, the BEng in Drone Technology and Operations is designed to equip engineers 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 and abroad.

This is a practical, hands-on course in which the candidate will get to build and fly their very own drone, which they will then be able to keep. The candidate will learn the legal and safety aspects of 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.

This course enables candidates to develop all of the mechanical and electrical skills required by the modern engineer including the use of computational tools such 3D Computer Aided Design, Finite Element Analysis, MATLAB/Simulink, Computational Fluid Dynamics and 3D image processing.

The employment opportunities are on the increase in this sector and there is currently much demand for SUA qualified engineers. Some typical areas of UAV applications are in the fields of: Logistics, Emergency Services, Military, Agriculture, Surveying, Forestry, Ecology, Archaeology, Virtual Reality, Gaming and Education.

The BEng in Drone Technology and Operations is to be submitted for accreditation by the Royal Aeronautical Society (RAeS) and the Institution of Mechanical Engineers (IMechE) in the Autumn of 2017. The programme has been designed to provide candidates with the required training for registering for Chartered Engineer (CEng.) status.

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Drone Technology and Operations will also

	Level 4	Level 5	Level 6 (Ord)	Level 6 (Hons)
A5	be able to demonstrate an understanding of drone hardware issues, including interfacing and data communications from the GPS, IMU and radio control devices and their impact on the overall design and performance of the drone flight control system. The student will also be able to explain the fundamental legislative requirements and good operational practice with regard to drone operations.	be able to design and safely construct a drone and demonstrate an understanding of drone hardware issues, including interfacing and data communications from the GPS, IMU and radio control devices and their impact on the overall design and performance of the drone flight control system. The student will also be able to explain the fundamental legislative requirements and good operational practice with regard to drone operations.	be able to demonstrate the knowledge and understanding required to legally and safely design, manufacture and operate Unmanned Aircraft Systems (UAS). The candidate will also be able to analyse the benefits and drawbacks of a UAV design and demonstrate an understanding of drone hardware issues, including interfacing and data communications from the GPS, IMU and radio control devices and their impact on the overall design and performance of the drone flight control system. The student will also be able to explain up to date legislative requirements and offer sound operational advice with regard to drone operations.	be able to demonstrate the knowledge and understanding required to legally and safely design, manufacture and operate Unmanned Aircraft Systems (UAS). The candidate will also be able to critically evaluate the benefits and drawbacks associated with specific UAV designs based on an in depth understanding of drone hardware issues, including interfacing and data communications from the GPS, IMU and radio control devices and their impact on the overall design and performance of the drone flight control system. The student will also be able to explain up to date legislative requirements and offer sound operational advice with regard to complex drone operations.
C5	have the necessary skills to operate as SUA maintenance technicians and operators.	have the necessary skills to operate as SUA repair & maintenance technicians and operators.	have the necessary skills to operate as SUA qualified engineers involved in UAV design and operations. Some typical areas of UAV applications are in the fields of logistics, defence and surveying.	have the necessary skills to operate at a high level as SUA qualified engineers involved in complex UAV designs and operations. Some typical areas of UAV applications are in the fields of logistics, defence and surveying.

Module Grid for BEng (Hons) Drone Technology & Operations

<table>
<tr><th>Year 1
(Level 4)</th><th>Year 2
(Level 5)</th><th>Year 3
(Level 6)</th></tr>
<tr><td>ENG461
Engineering Maths
Core Module
20 Credits</td><td>ENG537
Further Eng Maths
Core Module
20 Credits</td><td>ENG684
Dissertation
Core Module
40 Credits</td></tr>
<tr><td>ENG458
Mechanical Science
Core Module
20 Credits</td><td>ENG52F
Business, Research & Professional Development
Core Module
20 Credits</td><td>ENG685
Engineering Modelling & Simulation
Core Module
20 Credits</td></tr>
<tr><td>ENG459
Electrical Science
Core Module
20 Credits</td><td>ENG52G
Engineering Mechanics & Design
Core Module
20 Credits</td><td>ENG687
Aerodynamics
Core Module
20 Credits</td></tr>
<tr><td>ENG417
Engineering Design Practice
Core Module
20 Credits</td><td>ENG52K
Embedded Systems
Core Module
20 Credits</td><td>ENG693
Advanced UAV Operations
Core Module
20 Credits</td></tr>
<tr><td>ENG419
Materials & Manufacturing
Core Module
20 Credits</td><td rowspan="2">ENG52N
Drone Design & Construction
Core Module
40 Credits</td><td rowspan="2">ENG689
UAV Sensor Technology
Core Module
20 Credits</td></tr>
<tr><td>ENG481
Drone Technology & Operations
Core Module
20 Credits</td></tr>
</table>

BEng (Hons) Renewable and Sustainable Engineering

JACS3 Code: H221

Distinctive features of the programme

The UK and many other counties worldwide have signed legally binding contracts to reduce carbon dioxide emissions by 80% in 2050. This will mean a transition from traditional fossil fuel energy sources to renewable and sustainable energies. This BEng (hons) programme offers a graduate a chance to access this exciting, dynamic and highly innovative field.

The programme aims to provide an up-to-date overview of all 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 energy into useful forms.

As well as the engineering aspects we also cover energy economics and markets including cost/ benefit/ tariff/risk analysis of renewables 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.

As well as specialist renewable modules the programme also delivers a wide range of related supporting subjects including:

- Mechanical and electrical engineering
- Thermo Fluids, turbo machinery & Energy conversion
- Aerodynamics
- Business research
- Composite materials
- Engineering modelling and structural analysis.

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

The diverse and unique mix of skills gained in completing this programme is designed to equip a student with a wide range of employability skills not only within renewable energy but many other engineering sectors. There is a good opportunity to work worldwide within the energy sector. An up to date range of the employment opportunities within the sector can be found at:
http://jobfinder.renewableuk.com/jobseeker/search/results/
http://www.renewablescareers.com/

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Renewable and Sustainable Engineering will also

	Level 4	**Level 5 Dip HE**	**Level 6 (Ord)**	**Level 6 Honours (Hons)**
A5	be able to: Demonstrate a knowledge of the factors and issues of energy production; Demonstrate an understanding of the social, economic and environmental issues surrounding sustainability and energy security.	be able to: Deepen their understanding of renewable energy; Design and specify renewable energy schemes predicting energy output with sound judgment taking into account the environmental, economic and social consequences.	learn key skills of cooperation, organisation, communication and teamwork.	be able to: Develop a critical understanding of renewable energies and strategies to solve complex problems pertaining to them; Analyse and critically apprise current and emerging technologies.
C5	be able to demonstrate an understanding of climate change and the way humans contribute to it with the use of fossil fuels, how various current energy systems work and the need for effective energy storage and carbon free solutions.	be able to creatively deal with renewable energy scheme designs and feasibility studies systematically, making sound engineering judgements.	be able to: Manage information systems in a variety of types; Utilise a range of tools and techniques to develop renewable energy schemes.	be able to; Creatively deal with complex evaluation and finding solutions to renewable energy problems using various tools and techniques; Propose, plan undertake and report a self-directed energy or sustainability dissertation.

Module Grid for BEng (Hons) Renewable and Sustainable Engineering

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG537** Further Engineering Maths *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG565** Electrical Power Engineering *Core Module* *20 Credits*	**ENG688** Design for X *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG52J** Structures Analysis *Core Module* *20 Credits*	**ENG694** Advanced Renewable Technology *Core Module* *20 Credits*
ENG477 Sustainable Design *Core Module* *20 Credits*	**ENG52Q** Renewable Energy Engineering *Core Module* *40 Credits*	**ENG691** Composite Materials *Core Module* *20 Credits*
ENG483 Energy Systems & Sustainability *Core Module* *20 Credits*		

BEng (Hons) Electrical & Electronic Engineering

JACS3 Code: H600

Distinctive features of the programme

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

Modern electric drives are very complex systems comprising new types of electrical machines, power electronics based on fully controlled switches and digital control utilising new strategies and algorithms.

Therefore these advances in the area of electric drives and motion control require engineers to gain new knowledge and skills relevant to these developments. To reflect this demand this programme will focus the students on subjects in system modelling and simulation, control engineering and electrical power systems design and analysis.

Specialisms within this programme feature modern power electronics and drive systems combined with their controlling mechanisms and modelling using MATLAB and state space models.

In the **Electronic Industry,** for example electronic engineers are required to design electronic control circuits, electronic indicators, safety electronic protection, and data communication systems.

Electronic engineers are also involved with signalling and advanced railway 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.

Electronic engineering graduates are also desired for the fast moving consumer goods industry e.g. development of the latest smart screens and the use of intelligent transducers in both and industrial and a home automation environment.

To prepare students for these fast changing roles, the Electronics programme covers design, modelling and test algorithms for complex electronic assemblies. Analysis of electronic 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.

Job Link: https://engineering-**jobs**.the**iet**.org

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Electrical and Electronic Engineering will also

	Level 4 Cert HE	Level 5 Dip HE	Level 6 Degree	Level 6 Honours Degree
A5	be able to demonstrate a knowledge of the electrical and electronic engineering principles and circuit theory.	be able to: Deepen their understanding of electrical and electronic engineering; Be able to design and implement basic electrical and electronic engineering systems.	be able to develop a knowledge of principles of engineering design in the area of electrical and electronic engineering.	be able to develop a comprehensive knowledge on modern electrical and electronic engineering design and testing and in-depth understanding of state-of-art electrical communications and PLC engineering practices.
C5	be able to demonstrate skills of the usage of the electrical and electronic test equipment and understanding of the principles of their applications.	be able to demonstrate skills of effective design, modelling and performance analysing of basic electrical and election engineering systems.	be able to deal with electrical and electronic engineering solutions and make sound engineering judgment to solve electrical related problems.	be able to: Deal with the complex evaluation and finding solutions to electrical and electronic engineering problems using various tools and techniques; Propose, plan undertake and report a self-directed dissertation in the area of electrical and electronic engineering.

Module Grid for BEng Electrical & Electronic Engineering

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG537** Further Engineering Maths *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG52R** Instrumentation and Control *Core Module* *20 Credits*	**ENG60C** Electronics, Design & Testing *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG52B** PLCs *Core Module* *20 Credits*	**ENG696** Further Control Engineering *Core Module* *20 Credits*
ENG467 Analogue & Digital *Core Module* *20 Credits*	**ENG563** Applied Analogue & Digital Electronics *Option Module* *20 Credits* **and** **ENG560** Embedded Systems *Option Module* *20 Credits*	**ENG663** Industrial Communications Engineering *Option Module* *20 Credits*
	OR	
ENG483 Energy Systems & Sustainability *Core Module* *20 Credits*	**ENG564** Electrical Machines *Option Module* *20 Credits* **and** **ENG565** Electrical Power Engineering *Option Module* *20 Credits*	**ENG645** Power electronics and Electric Drives *Option Module* *20 Credits*

Optional modules are available in level 5 and level 6, and provide an electrical or electronic bias to the degree programme.

Students taking ENG563 and ENG560 must take ENG663
Students taking ENG564 and ENG565 must take ENG645

BEng (Hons) Automation Engineering

JACS3 Code: H661

Distinctive features of the programme

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'.

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Automation Engineering will also

	Level 4	Level 5	Level 6	Level 6 (Hons)
A5	Identify and describe components and theory used in modern and emerging industrial automation processes.	Apply a comprehensive knowledge of industrial process systems to validate new system architecture.	Demonstrate an ability to critically appraise existing controlled processes, make judgements and propose solutions.	Propose and formulate a new automation/control system through a programme of self-managed learning.
C5	Appreciate the use and limitations of the latest technology in sensors, communication, electrical drives and robotics.	Formulate and implement solutions to complex new and existing automation problems	Analyse data to improve the efficiency of existing systems using the latest technology in sensors, communication, electrical drives and robotics.	Through analysis and reasoning be able to communicate the justification of a student lead design project. Critically review, consolidate a systematic and coherent body of knowledge in automation.

Module Grid for BEng (Hons) Automation Engineering

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG537** Further Engineering Maths *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG52H** Robotics *Core Module* *20 Credits*	**ENG667** Maintenance & Safety Systems *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG564** Electrical machines *Core Module* *20 Credits*	**ENG645** Power electronics and Electric Drives *Core Module* *20 Credits*
ENG412 Transducers *Core Module* *20 Credits*	**ENG52R** Instrumentation and Control *Core Module* *20 Credits*	**ENG663** Industrial Communication Systems *Core Module* *20 Credits*
ENG483 Energy Systems & Sustainability *Core Module* *20 Credits*	**ENG52B** PLC *Core Module* *20 Credits*	

BEng (Hons) Optoelectronics & Holography

JACS3 Code: H680

Distinctive features of the programme

There has been a recent exponential growth of optoelectronics and cutting edge ultra-realistic imaging, particularly in the development of nano and micro opto-electromechanical systems for avionics photonics applications. Ultra-realistic imaging is a term used to signify a type of imaging which is so accurate that the unaided human observer is unable to distinguish a reproduced image from an original object. The most successful technique of accomplishing ultra-realistic imaging to date has been shown to be holography.

The BEng (Hons) Optoelectronics & Holography programme provides a progression path to optoelectronics and holography for students with a Science or Engineering background. The training objective is to produce graduates capable of exploiting and leading in this enabling and rapidly evolving sector with the necessary skills to work in any area of the electronics industry. With established optoelectronic and aerospace links and collaboration with a large number of international firms such as Airbus in the locality, training is based on practical industrial and academic problems. The specialist modules within the curriculum of this programme also focus on tacit knowledge training from the Engineering Department's world leading Ultra-Realistic Imaging Research Centre. The core learning is associated with the BEng Electronic Engineering programme and features 13 existing related supporting electrical and electronic engineering modules and 3 new research informed specialised modules, one for each year of study. The programme is designed for accreditation by the Institution of Engineers and Technology (IET).

The BEng in Optoelectronics & Holography will provide students with the skills to work in any area of the electronics industry, particularly in the innovations sector, with products such as wearable devices, flexible screens, two and three dimensional vision to the automotive industry and Aerospace, where the future is increasingly electro-optic. BEng courses catering for this tend to be offered at up to £18,500 for international applicants with an average of 8.25 overall applicants per place, indicating the strong demand from the industry for these graduates**.** As mentioned above, the local area is flush with investment with Airbus and Sealand being amongst significant local employers.

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Optoelectronics & Holography will also

	Level Four	Level Five	Level Six (Ordinary)	Level Six (Hons)
A5	Demonstrate a knowledge of holographic and conventional imaging, opto-mechanical engineering systems and the associated principles and limitations Develop an understanding of the relevant mathematical, mechanical electrical, optical and holographic principles	deepen their knowledge and understanding and laboratory skills, with the ability to deal with relevant engineering principles, devices and systems	develop key knowledge and in-depth understanding and analytical skills, with the ability to deal with novel situations	be able to: • Conduct and analyse advanced technical experiments, adapting professional experimental procedures to novel situations, analysing experimental data in detail, and drawing comprehensive conclusions • Demonstrate tacit knowledge and in-depth understanding of opto-electromechanical and embedded systems, coherent and non-coherent two and three-dimensional imaging, holography, fibre optics, optical and microwave technologies • Investigate and critically evaluate new related technologies and present information in a professional report • Develop an understanding of advanced mathematical and numerical methods to effectively address related real world problems

C5	Demonstrate an understanding of holographic and conventional imaging systems, opto - electrical and photonic silicon technologies, and the associated theoretical principles, limitations and methodologies through analysis and prediction Analyse and compare the performance of typical optical imaging system Applying the theoretical principles to practical conditions and analyse device/ system performance	Creatively deal with design and construction of holographic and opto-electrical devices/systems and devise methods of testing to check for given performance criteria	Design, construct and test a wide array of opto-electrical, photonic silicon and holographic devices/ systems Work efficiently in professional design, modelling, optimisation and performance of opto electrical systems in any area of the electronics and photonics industry	Be able to: • Exploit and lead in opto-electrical, photonic silicon and holographic technologies with the necessary skills to work in any area of the electronics industry • Use industry standard software and work efficiently in professional design, modelling, optimisation and performance of opto electrical systems in any area of the electronics and photonics industry. • Critically analyse and make professional engineering judgments on a wide array of opto electrical technologies relevant to numerous electronic, imaging and applied photonics applications.

Module Grid for BEng (Hons) Optoelectronics & Holography

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG537** Further Engineering Maths *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG52K** Embedded Systems *Core Module* *20 Credits*	**ENG697** Optical Microwave Technology *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG52P** Fibre Optics *Core Module* *20 Credits*	**ENG689** UAV Sensor Technology *Core Module* *20 Credits*
ENG467 Analogue & Digital Electronics *Core Module* *20 Credits*	**ENG52T** Holography Project *Core Module* *40 Credits*	**ENG663** Industrial Communication Systems *Core Module* *20 Credits*
ENG478 Physics of Light *Core Module* *20 Credits*		

BEng (Hons) Aerospace and Modern Optics

JACS3 Code: H400

Distinctive features of the programme

Applications to aerospace related courses have been on a general upward trend since 2008/09 with applications for 2016/17 entry showing a 7.23% annual increase according to UCAS data. As of the summer of 2016, UCAS listed three UK Universities offering degree courses in space technology, with typical programme entry offers ranging from 260 to 380 UCAS points (must include Maths and either Physics, or Science and Technology based subjects). All three universities offer an option of an additional year in industry.

At Glyndŵr University, the BEng Aerospace and Modern Optic course, students will be offered an in depth understanding of the related practical industrial applications. They will not undertake an optional year in industry, but utilising expert facilities, international experts and widely experienced engineers driven by state-of-the-art research, they will be encouraged to undertake a series of rigorous hands-on exercises and case studies built upon the department's extensive long term industrial contract research. Efforts are put into originality, so that the solution requires the students' own innovative application of knowledge and techniques. The Aerospace and Modern Optics BEng programme features 13 existing related supporting mechanical and electrical engineering modules and 3 completely new research informed specialised modules, one per year/ Level of study. The new modules map onto our unique history of contract research and consultancy in many important application aspects of the programme. The programme will be submitted for accreditation by the Institution of Engineers and Technology (IET), and the Royal Aeronautical Society (RAeS) in the Autumn of 2017.

The skills gap and the increased commercial activity in this niche engineering market , the potential for a Welsh space port at Llandbedr, and the overall trend within an increasingly expanding industry that is currently valued at £24Bn to the UK economy, builds a strong case for national and global employment opportunities within this sector. Additionally the local area is flush with investment with Airbus and Sealand being amongst significant local employers

In addition to meeting the generic Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Aerospace and Modern Optics will also

	Level Four	Level Five	Level Six (Ordinary)	Level Six (Hons)
A5	Demonstrate a knowledge of image-understanding, opto-mechanical engineering and the associated principles and limitations Develop an understanding of the relevant mathematical, mechanical electrical and optical principles	Deepen their knowledge and understanding and laboratory skills, with the ability to deal with relevant engineering principles, devices and systems	Develop key knowledge and in-depth understanding and analytical skills, with the ability to deal with novel situations	Be able to: (i) develop tacit knowledge and in-depth understanding of • advanced mathematical and numerical methods to effectively address aerospace and modern optic real world problems, • physics of light • the technique and application of finite elements • flight control, opto-electromechanical sensor technology • modern optics and aerospace, two and three-dimensional image understanding, optical and microwave technologies • opto- electromechanical components and tools, their capabilities and limitations (ii) Conduct and analyse experiments, adapting experimental procedures to novel situations if necessary, analysing experimental data in detail, and drawing comprehensive conclusions

C5	Demonstrate an understanding of imaging, typical optical imaging systems, opto - electromechanical and control systems, and the associated theoretical principles, limitations and methodologies through analysis and prediction Analyse and compare the performance of typical optical imaging system applying the theoretical principles to practical conditions	Creatively deal with design and construction of related devices/systems and devise methods of testing to check for given performance criteria	Design, construct and test a wide array of opto mechanical and photonic technologies relevant to numerous aerospace relevant applications and able to meet system performance criteria	Develop an ability to design, construct, test and critically evaluate performance criteria of a wide array of opto mechanical and photonic technologies relevant to numerous aerospace relevant applications: nano-photonics; imaging, micro electromechanical processing, meta-materials, photonic integrated circuits, solar cells& OLEDs

Module Grid for BEng (Hons) Aerospace and Modern Optics

Year 1 (Level 4)	**Year 2** (Level 5)	**Year 3** (Level 6)
ENG461 Engineering Maths *Core Module* *20 Credits*	**ENG537** Further Engineering Maths *Core Module* *20 Credits*	**ENG684** Dissertation *Core Module* *40 Credits*
ENG458 Mechanical Science *Core Module* *20 Credits*	**ENG52F** Business, Research & Professional Development *Core Module* *20 Credits*	**ENG685** Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG459 Electrical Science *Core Module* *20 Credits*	**ENG52G** Engineering Mechanics & Design *Core Module* *20 Credits*	**ENG697** Optical Microwave Technology *Core Module* *20 Credits*
ENG417 Engineering Design Practice *Core Module* *20 Credits*	**ENG52J** Structures Analysis *Core Module* *20 Credits*	**ENG689** UAV Sensor Technology *Core Module* *20 Credits*
ENG419 Materials & Manufacturing *Core Module* *20 Credits*	**ENG52U** Optomechanical Project *Core Module* *40 Credits*	**ENG687** Aerodynamics *Optional Module* *20 Credits*
ENG478 Physics of Light *Core Module* *20 Credits*		**ENG690** Structural Vibration *Optional Module* *20 Credits*

Optional modules are only available in level 6, all optional modules are a core module from an alternative engineering programme.

BEng (Hons) Aircraft Maintenance (top up)

JACS3 Code: H410

Distinctive features of the programme

This one-year top-up programme aims to produce graduates a comprehensive knowledge on *modern aircraft maintenance legislation, regulation and planning and an in-depth understanding on modern aircraft maintenance practice. It provides skills on dealing with complex aircraft maintenance, design and structural analysis issues systematically and creatively, and make sound engineering judgements. It emphasises the breadth and depth of learning, skills and attitudes for graduates to meet the future needs of a rapidly changing technology and business environment. The graduates will be equipped with analytical, computational, design and transferable skills, and including an awareness of social and environmental implications, will be able to play leading professional roles in aeronautical and mechanical engineering and related industries, to show initiative, to take responsibility and to make decisions in complex and unpredictable situations.

Career opportunities are wide ranging and the present shortage of practising engineers in the fields of aircraft maintenance, mechanical, and manufacturing engineering which should lead to an increased demand from industry in future years. Students on these programmes in the past have been successful in seeking employment as engineering personnel with renown organisations such as Airbus, British Airways, Jaguar Cars Ltd, J C Bamford Excavators Limited (JCB), Kellogg's Co. of Great Britain Ltd, Kronospan Ltd, Rolls Royce plc, Siemens, Toyota Motor Manufacturing Ltd, to name a few.

In addition to meeting the generic Level Six (Hons) Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Aircraft Maintenance will also

	Level 4	Level 5	Level 6	Level 6 (Hons)
A5	N/A	N/A	N/A	Demonstrate a comprehensive knowledge on modern aircraft maintenance legislation, regulation and planning and an in-depth understanding on modern aircraft maintenance practice.
C5	N/A	N/A	N/A	Deal with complex aircraft maintenance inspection, planning optimisation issues systematically and creatively, and make sound engineering judgments.

Module Grid for BEng (Hons) Aircraft Maintenance (top up)

BEng **Aircraft Maintenance**
Year 3 (Level 6)
ENG684 Dissertation *Core Module* *40 Credits*
ENG686 Aircraft Maintenance Project *Core Module* *20 Credits*
ENG687 Aerodynamics *Core Module* *20 Credits*
ENG690 Structural Vibration *Core Module* *20 Credits*
ENG699 Aircraft Maintenance Planning *Core Module* *20 Credits*

BEng (Hons) Composite Design

JACS3 Code: H900

Distinctive features of the programme

The utilisation of composite materials has grown extensively over the past few decades in industrial applications. Composite materials are very complex systems comprising two or more different types of materials. Therefore, a design of composites is a complicated and challenging problem which combines knowledge of materials, ability to design and manufacture composite products.

This BEng Composite Design (Top-Up) is designed to equip students with essential theoretical and practical knowledge. The programme provides an up-to-date detailed overview of different types of composite materials (polymer, ceramic and metal matrix composites), advanced materials (hybrid, smart, nano, etc.), their manufacture and design. It will be delivered by academics from research and industrial backgrounds through lectures, active learning sessions and hands on practical lessons. A range of laboratory facilities is provided, and includes a materials laboratory, a fully-equipped specialist composite workshop (Advanced Composite Training and Development Centre) and a variety of design software (CATIA, ABAQUS and ANSYS).

The programme will enable candidates to develop a deep understanding in composites design and prepare them for employment in a wide range of industries in aerospace, nuclear, marine, renewables, defence, motorsport, rail, construction industry (Rolls-Royce, Raytheon, Magellan, Airbus, Volkswagen, etc.). 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 .

Course content:

- Composite Design & Manufacture
- Composite Materials
- Design for X
- Engineering Modelling & Simulation
- Dissertation

In addition to meeting the generic Level Six (Hons) Programme Learning Outcomes detailed in section 18 above, students on BEng (Hons) Composite Design will also

	Level 4	**Level 5**	**Level 6**	**Level 6 (Hons)**
A5	N/A	N/A	N/A	Demonstrate a comprehensive knowledge and advanced problem solving skills for a range of composite engineering and design problems
C5	N/A	N/A	N/A	Develop specific skills required for continuing professional development in composite design, deal with complex requirements to design a range of composite products for different industrial applications.

Module Grid for BEng (Hons) Composite Design

Year 3 (Level 6)
ENG684 Dissertation *Core Module* *40 Credits*
ENG685 Engineering Modelling & Simulation *Core Module* *20 Credits*
ENG688 Design For X *Core Module* *20 Credits*
ENG691 Composite Materials *Core Module* *20 Credits*
ENG60A Composite Design & Manufacture *Core Module* *20 Credits*