OFFICE USE ONLY	
Date of validation event:	05 August 2019
Date of approval by Academic Board:	11 September 2019
Approved Validation Period:	*5 years from September 2019*
Date and type of revision:	26 September 2019 *Administrative correction to programme titles*

PART TWO PROGRAMME SPECIFICATION

BEng (Hons) Production Engineering
BEng (Hons) Industrial Engineering Design (Mechanical)
BEng (Hons) Industrial Engineering Design (Electrical & Electronic)

1 Awarding body

Glyndŵr University

2 Programme delivered by

Glyndŵr University

3 Location of delivery

Glyndŵr University Plas Coch Campus

4 Faculty/Department

Engineering
Faculty of Arts, Science and Technology

5 Exit awards available

BEng (Ordinary) Production Engineering
BEng (Ordinary) Industrial Engineering Design (Mechanical)
BEng (Ordinary) Industrial Engineering Design (Electrical & Electronic)
DipHE Production Engineering
DipHE Industrial Engineering Design (Mechanical)
DipHE Industrial Engineering Design (Electrical & Electronic)
CertHE Engineering

6 Professional, Statutory or Regulatory Body (PSRB) accreditation

7 Accreditation available

Post validation, accreditation will be sought from the Institution of Mechanical Engineers (IMechE) and the Institution of Engineering and Technology (IET). This

accreditation is not required for the delivery of these Degree Apprenticeships for Wales.

This information is correct at the time of validation, please refer to the PSRB register for current accreditation status.

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

N/A

9 JACS3 / HECoS **codes**

H150 (Engineering Design) / 100182 (Engineering design)
H700 (Production & manufacturing engineering) / 100209 (Production and manufacturing engineering)

10 UCAS **code**

N/A

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

Subject Benchmark Statement; Engineering February 2015

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

https://www.engc.org.uk/engcdocuments/internet/Website/UK-SPEC%20third%20edition%20(1).pdf
Engineering Council, UK-SPEC third edition (2016)
Engineering Council, UK-SPEC document "The Accreditation of Higher Education Programmes" third edition
Sector Skills Council for Science, Engineering and Manufacturing Technologies (SEMTA)

13 **Mode of study**

Part time

14 **Normal length of study** for each mode of study
Note that students are not eligible for funding for a postgraduate qualification if the duration of the part time route is more than double the duration of the full time route.

3 years

16 **Language of study**

English

17 Criteria for admission to the programme

Standard entry criteria

For the three-year degree apprenticeship route applicants must be in full time relevant employment in a role aligned to the Engineering Degree Apprenticeship (Wales) framework (2019). Decisions on entry for this programme will be made in partnership between the University and the Employer ensuring that the candidate meets the standard academic entry requirements as well as the professional and

employer entry requirements which varies between employer. This will be determined pre-application by the relationship manager, industry link within the programme team and employer representative. All apprentices enter into a three way learning agreement upon acceptance to the programme.

Entry requirements are in accordance with the University's admissions policy https://www.glyndwr.ac.uk/en/Howtoapply/Admissionspolicies/7_Admissions%20Policy%20-%20October%202018%20revision%20final.pdf

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

Foundation Year/FdA/FdSc	48 Tariff points and /or relevant experience
3 year Bachelor	112 Tariff points
Integrated Masters	120 Tariff points

These figures are intended as a general guide. Each application is considered individually.

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

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

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

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

DBS Requirements

N/A

Non-standard entry criteria and programme specific requirements

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

The University, in line with the Degree Apprenticeship provision in Wales, is committed to ensuring that applicants with vocational qualifications and/or significant workplace experience are able to access these Degree Apprenticeship Programmes.

The University has developed a portfolio based on the competencies outlined within the Apprenticeship Framework to enable apprentices to evidence these skills and competencies as part of the apprenticeship programme. This skills portfolio is a tool

to enable the apprentice and employer to evidence the higher level skills and competencies developed in the work place as part of the apprenticeship programme. This portfolio is made available to employers and prospective apprentices as part of the admissions process when standard entry requirements are not met. Each candidate and employer will be interviewed by their relationship manager to review their skills portfolio to date and to assess whether advanced entry (RPL/RPEL) is appropriate for the needs of the company and the individual.

18 Recognition of Prior (Experiential) Learning

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

Programme specific restrictions

N/A

19 Aims of the programme

The 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.

Additionally, the student's competencies are to be assessed within the workplace by the employer; specifically, professional behaviour, health and safety and company roles, responsibilities and working practices. This will be evidenced within the three-way progress meetings throughout the programme by the personal/industry tutor.

The qualifications within this submission are designed to provide apprentices with the essential knowledge, skills and techniques which underpin and enhance the learning process. They will be encouraged to develop a positive, reflective and professional approach to their learning, taking responsibility for their own progression and career development. These transferable skills enable and promote sustainable lifelong learning and continuing professional development within their professional field or sector. The programmes are designed to provide an opportunity for apprentices to apply their knowledge, skills and ideas within their own working environment.

20 Distinctive features of the programme

The Degree Apprenticeship Engineering Programmes have 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.

Degree apprenticeships in Wales are work-based learning programmes that provide opportunities for individuals working in Wales to develop relevant industry knowledge and job competencies while in paid employment, gaining the experience of doing a particular job(s).

Developed as a three-way learning partnership between the employer, the student and the academic programme team, the programmes will enable students to develop skills which will be in high demand in the future, meeting regional skills gaps.

Designed in response to employer need, students will study one day per week with the remaining four days in employment. By utilising the full calendar year and applying core tenants of work-based learning, students will achieve their award in three years.

Each apprentice is assigned an industry mentor who will support the apprentice and their employer to identify relevant and appropriate projects as well as ensure that both the employer and apprentice needs are met. Tutorials/progress reviews are an embedded feature within the programme and will encourage the engagement of the employer within the programme ensuring an open three-way dialogue between the provider, employer and apprentice with regular feedback on technical and professional skills and competencies in line with the Skills and Competencies portfolio aligned to the framework.

Where necessary the Industry Mentor or Work-Related Learning Unit will work with the employers to that the employers are supported and trained to provide the best experience and support to their apprentices. WGU provides complimentary mentoring, professional supervision and coaching courses to expand the skills of apprentice supervisors and managers to ensure that the learning that is applied to the workplace is effective and impactful.

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.

All aspects of this programme and the delivery align with the relevant competencies and outcomes detailed on the Degree Apprenticeship for Wales Level 6 Engineering Framework (2019) Pathways as well as complying with the provisions of the Apprenticeships, Skills, Children and Learning Act (2009), Specification of Apprenticeship Standards for Wales and aligning with the QAA guidance for apprenticeship programmes.

21 Programme structure narrative

The three-year, part time apprenticeship programme will utilise the extended academic year with three trimesters of delivery enabling students to undertake 120 credits per extended academic year. This programme has three entry points, September, January and May. This is to ensure the flexibility required by Apprenticeship provision. Each intake will follow the same programme structure as detailed below. The primary intake at will be September, however collaborative delivery may utilise the January intake of students. The May intake is a further possible option, dependent on funding. Day release taught modules will be delivered over three trimesters with assessment and progression boards taking place in line with the University structure (September).

22 Programme structure diagram

<table>
<tr><td rowspan="2">Manufacturing
(BEng Production Engineering)</td><td colspan="2">Design
(BEng Industrial Engineering Design)</td></tr>
<tr><td>Mechanical</td><td>Electrical/Electronic</td></tr>
<tr><td colspan="3">Level 4</td></tr>
<tr><td colspan="3">ENG495 Analytical Engineering Techniques</td></tr>
<tr><td colspan="3">ENG497 Electrical Engineering</td></tr>
<tr><td colspan="3">ENG499 Mechanical Engineering</td></tr>
<tr><td colspan="3">ENG4AA Work Based Learning</td></tr>
<tr><td colspan="3">ENG498 Engineering Standard, Business & Operations Management</td></tr>
<tr><td colspan="3">ENG496 Design & CAD</td></tr>
<tr><td colspan="3">Level 5</td></tr>
<tr><td colspan="3">ENG5AD Industrial Project</td></tr>
<tr><td colspan="3">ENG5AA Analytical Control Techniques</td></tr>
<tr><td colspan="3">ENG5AJ Modern Manufacture, Sustainability & Industry 4.0</td></tr>
<tr><td colspan="2">ENG5AF Materials & Processes</td><td>ENG5AE Instrumentation & Condition Monitoring</td></tr>
<tr><td>ENG5AC Industrial Automation & PLCs</td><td>ENG5AB Computer Aided Engineering</td><td>ENG5AC Industrial Automation & PLCs</td></tr>
<tr><td>ENG5AH Mechatronics Application & Manufacturing Systems</td><td>ENG 5AG Mechanical System Design</td><td>ENG5AK Power, Distribution & System Design</td></tr>
<tr><td colspan="3">Level 6</td></tr>
<tr><td colspan="3">ENG6AG Project</td></tr>
<tr><td colspan="3">ENG6AE Managing Workforce, Engagement & Commitment</td></tr>
<tr><td colspan="3">ENG6AD Maintenance & Safety Systems</td></tr>
<tr><td>ENG6AC Machine & Production Systems</td><td colspan="2">ENG6AA Engineering Modelling & Simulation</td></tr>
<tr><td>ENG6AB Industrial Communication Systems</td><td>ENG6AF Product Design</td><td>ENG6AB Industrial Communication Systems</td></tr>
</table>

BEng (Hons) Degree Apprenticeship Programme: ***September Intake***					
Semester	**Module Title**	**Module Leader**	**Credits**	**Core/Opt**	**Level**
S 1-2	Analytical Engineering Techniques	M Kochneva	20	Core	Level 4
	Electrical Engineering	A Sharp			
	Mechanical Engineering	O Durieux			
	Design & CAD	N Vidmer			
S 1-3	Engineering Standard, Business & Operations Management	N Vidmer			
	Work Based Learning	T Mitchell			
S 1-2	Computer Aided Engineering	M Jones	20	Core	Level 5
	Analytical Control Techniques	M Kochneva			
	Modern Manufacture, Sustainability & Industry 4.0	O Durieux			
	Materials & Processes	M Jones			
	Industrial Automation & PLCs	Z Chen			
	Instrumentation & Condition Monitoring	Z Chen			
	Power, Distribution & System Design	Y Vagapov			
	Mechanical System Design	R Bolam			
	Mechatronics Application & Manufacturing Systems	M Soufian			
S 1-3	Industrial Project	T Mitchell			
S 1-2	Managing Workforce, Engagement & Commitment	D Sparke	20	Core	Level 6
	Product Design	R Bolam			
	Machine & Production System	O Durieux			
	Industrial Communication System	S Shoaib			
	Engineering Modelling & Simulation	S Monir			
	Maintenance & Safety System	F Mansour			
S 1-3	Project	A Sharp	40		

BEng (Hons) Degree Apprenticeship Programme: ***January Intake***					
Semester	**Module Title**	**Module Leader**	**Credits**	**Core/Opt**	**Level**
S 2-3	Analytical Engineering Techniques	M Kochneva	20	Core	Level 4
	Electrical Engineering	A Sharp			
	Mechanical Engineering	O Durieux			
	Design & CAD	N Vidmer			
S 2-3-1	Engineering Standard, Business & Operations Management	N Vidmer			
	Work Based Learning	T Mitchell			
S 2-3	Computer Aided Engineering	M Jones	20	Core	Level 5
	Analytical Control Techniques	M Kochneva			
	Modern Manufacture, Sustainability & Industry 4.0	O Durieux			
	Materials & Processes	M Jones			
	Industrial Automation & PLCs	Z Chen			
	Instrumentation & Condition Monitoring	Z Chen			
	Power, Distribution & System Design	Y Vagapov			
	Mechanical System Design	R Bolam			
	Mechatronics Application & Manufacturing Systems	M Soufian			
S 2-3-1	Industrial Project	T Mitchell			
S 2-3	Managing Workforce, Engagement & Commitment	D Sparke	20	Core	Level 6
	Product Design	R Bolam			
	Machine & Production System	O Durieux			
	Industrial Communication System	S Shoaib			
	Engineering Modelling & Simulation	S Monir			
	Maintenance & Safety System	F Mansour			
S 2-3-1	Project	A Sharp	40		

BEng (Hons) Degree Apprenticeship Programme: ***May Intake***					
Semester	**Module Title**	**Module Leader**	**Credits**	**Core/Opt**	**Level**
S 3-1	Analytical Engineering Techniques	M Kochneva	20	Core	Level 4
	Electrical Engineering	A Sharp			
	Mechanical Engineering	O Durieux			
	Design & CAD	N Vidmer			
S 3-1-2	Engineering Standard, Business & Operations Management	N Vidmer			
	Work Based Learning	T Mitchell			
S 3-1	Computer Aided Engineering	M Jones	20	Core	Level 5
	Analytical Control Techniques	M Kochneva			
	Modern Manufacture, Sustainability & Industry 4.0	O Durieux			
	Materials & Processes	M Jones			
	Industrial Automation & PLCs	Z Chen			
	Instrumentation & Condition Monitoring	Z Chen			
	Power, Distribution & System Design	Y Vagapov			
	Mechanical System Design	R Bolam			
	Mechatronics Application & Manufacturing Systems	M Soufian			
S 3-1-2	Industrial Project	T Mitchell			
S 3-1	Managing Workforce, Engagement & Commitment	D Sparke	20	Core	Level 6
	Product Design	R Bolam			
	Machine & Production System	O Durieux			
	Industrial Communication System	S Shoaib			
	Engineering Modelling & Simulation	S Monir			
	Maintenance & Safety System	F Mansour			
S 3-1-2	Project	A Sharp	40		

23 Intended learning outcomes of the programme

Undergraduate				
	Knowledge and understanding			
	Level 4	Level 5	Level 6	Level 6 Honours Degree
A1	*Develop an understanding of mathematical concepts or principles relevant to Industrial Engineering.*	*Apply mathematical concepts or principles relevant to Industrial Engineering problems.*	*Apply mathematical principles and analytical techniques to integrated Industrial Engineering problems.*	*Model and analyse complex industrial engineering systems using appropriate mathematical methods, while recognising the limitations of such analysis.*
A2	*Identify and explain scientific principles relevant to Industrial Engineering.*	*Develop scientific principles and demonstrate an understanding of relevant applications within Industrial Engineering.*	*Investigate Industrial Engineering principles and applications.*	*Demonstrate a wide knowledge and a comprehensive understanding of complex industrial engineering systems and the ability to analyse and synthesise such engineering principles and systems.*
A3	*Develop an awareness of current technologies and their uses within Industrial Engineering.*	*Appraise current and future technologies within Industrial Engineering and develop an awareness of the sustainability implications.*	*Display a critical awareness of current issues and future prospects at the forefront of the discipline*	*The critical evaluation of current and future developments within Industrial Engineering and the careful consideration of the sustainability implications.*

	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 in industrial engineering.*	*Innovate in solving novel and challenging problems and be aware of the limitations of the solutions in industrial engineering.*

Intellectual skills				
	Level 4	Level 5	Level 6	Level 6 Honours Degree
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.	*Analyse, evaluate and interpret engineering data.*	*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 laboratory experiments to investigate engineering principles and properties of devices and systems in industrial engineering.*	*Conduct and analyse experiments, adapting experimental procedures to novel situations if necessary, analysing experimental data in detail, and drawing comprehensive conclusions*

Subject skills				
	Level 4	Level 5	Level 6	Level 6 Honours Degree
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, test and evaluate 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 industrial engineering. Prepare descriptive, interpretive and evaluative technical reports.*	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 and 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.*

Practical, professional and employability skills				
	Level 4	Level 5	Level 6	Level 6 Honours Degree
D1	*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.*	*Communicate effectively in writing, verbally and through graphical representations.*	*Identify problems, bias and recommendations effectively through graphical, written and verbal forms of communication.*
D2	*Use oral, written and electronic methods for the communication of technical and other information.*	*Use oral, written and electronic methods for effective communication of technical and other 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	*Apply safe systems of work.*	*Manage and apply safe systems of work.*	*Learn independently and be familiar with how to access key information.*	*Evaluate and reflect on own performance and self-management.*
D4	*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.*	*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.*

BEng (Hons) Production Engineering

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

	Level 4	Level 5	Level 6	Level 6 (Hons)
A4	N/A	*Apply a comprehensive knowledge of industrial process systems to validate new system architecture.* *Be able to deepen their understanding of materials behaviour in combination with applied machine design.*	*Demonstrate an ability to critically appraise existing controlled processes, make judgements and propose solutions.* *be able to develop knowledge of principles of engineering design in the area of mechanical engineering.*	*Propose and formulate a new automation/control system through a programme of self-managed learning.* *be able to develop a comprehensive knowledge on modern mechanical engineering design and testing.*
C5	N/A	*Formulate and implement solutions to complex new and existing automation problems* *Be able to demonstrate skills of effective design, modelling and performance analysing of basic structural systems to machines and robotic systems.*	*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.*

BEng (Hons) Industrial Engineering Design (Electrical &Electronic)

In addition to meeting the generic Programme Learning Outcomes detailed above, students on Industrial Engineering Design (Electrical & Electronic) will also

	Level 4	Level 5	Level 6	Level 6 (Hons)
A5	N/A	*Apply a comprehensive knowledge of industrial process systems to validate new system architecture.* *be able to:* *Deepen their understanding of electrical and electronic engineering;* *Be able to design and implement basic electrical and electronic engineering systems.*	*Demonstrate an ability to critically appraise existing controlled processes, make judgements and propose solutions.* *be able to develop a knowledge of principles of engineering design in the area of electrical and electronic engineering.*	*Propose and formulate a new automation/control system through a programme of self-managed learning.* *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.*
C6	N/A	*Formulate and implement solutions to complex new and existing automation problems* *be able to demonstrate skills of effective design, modelling and performance analysing of basic electrical and election engineering systems.*	*Analyse data to improve the efficiency of existing systems using the latest technology in sensors, communication, electrical drives and robotics.* *be able to deal with electrical and electronic engineering solutions and make sound engineering judgment to solve electrical related problems.*	*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.* *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.*

BEng (Hons) Industrial Engineering Design (Mechanical)

In addition to meeting the generic Programme Learning Outcomes detailed above, students on Industrial Engineering Design (Mechanical) will also

	Level 4	Level 5	Level 6	Level 6 (Hons)
A6	N/A	*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.*
C7	N/A	*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.*

24 Curriculum matrix

	Module Title	Core or option?	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	C1	C2	C3	C4	C5	C6	C7	D1	D2	D3	D4
Level 4	Analytical Engineering Techniques	Core	X								X									X			
	Electrical Engineering	Core		X					X				X	X							X	X	
	Mechanical Engineering	Core		X					X				X	X							X	X	
	Work Based Learning	Core		X	X				X	X	X	X				X				X	X	X	X
	Engineering Standard, Business & Operations Management	Core			X							X			X	X				X	X	X	X
	Design & CAD	Core		X	X				X	X	X	X		X	X	X				X	X		X
Level 5	Industrial Project	Core		X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X
	Analytical Control Techniques	Core	X	X							X		X							X			
	Modern Manufacture, Sustainability & Industry 4.0	Core			X				X	X	X	X			X					X	X		
	Materials & Processes	Core		X	X	X		X	X	X	X	X	X				X		X	X		X	X
	Instrumentation & Condition Monitoring	Core	X	X	X				X		X		X	X	X			X		X	X		
	Industrial Automation & PLCs	Core			X	X	X	X	X	X	X	X	X	X			X	X	X	X		X	
	Computer Aided Engineering	Core			X			X	X			X		X	X				X	X	X	X	

	Module Title	Core or option?	A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	C1	C2	C3	C4	C5	C6	C7	D1	D2	D3	D4
	Mechatronics Application & Manufacturing Systems	Core		X	X	X			X	X			X	X						X	X	X	
	Mechanical System Design	Core		X	X			X	X	X	X	X		X	X	X			X	X	X		
	Power, Distribution & System Design	Core	X	X	X		X			X			X							X	X	X	
Level 6	*Project*	Core	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Managing Workforce, Engagement & Commitment	Core							X	X		X				X				X	X	X	X
	Maintenance & Safety System	Core			X				X	X					X					X	X	X	X
	Machine & Production System	Core			X	X				X	X	X					X			X	X	X	
	Engineering Modelling & Simulation	Core	X	X					X		X		X	X				X	X	X	X		
	Product Design	Core			X				X	X	X	X		X	X	X			X	X	X		X
	Industrial Communication System	Core			X	X	X	X		X			X	X			X	X	X	X	X		

25 Learning and teaching strategy

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

1. A key feature of apprenticeships is that the majority of learning and training takes place 'on-the-job' while apprentices are engaged in work activity. It is therefore fundamental that an apprentice's work will provide a source for learning, an environment for learning and the key context for learning. This is recognised by the team and supported by the provision on an Industry mentor linking the work-place to the programme of study.

2. 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. This will also provide the opportunity for apprentices to bring their work-based experiences back into the teaching space and develop a shared learning network with their peers.

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

4. 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.

5. 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.

6. 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.

7. Academic skills will be embedded into all programmes and modules. This will be evident through the key skills mapping to learning outcomes in module specifications. These skills will be developed through learning and teaching activities, online support, formative and summative assessment. Students will be made aware of the importance of academic skills and the embedding of these will be reviewed periodically by the programme team.

The programme places emphasis on the importance of reflective learning, and envisages students drawing on informal and formal feedback to engage in a dialogue with staff to help plan their future learning. The three-way progress reviews required every 61 days provide a communication channel for apprentice, employer and provider to facilitate the shared learning between the workplace and the classroom or laboratory.

The relationship between the employer, apprentices and industry mentor is overseen by a member of the Work-Related Learning Unit within the Enterprise Office at WGU.

In addition, Apprentices, in negotiation with employers and industry mentor, will be able to develop the ability to identify additional learning opportunities within the context of their day-to-day work activity. For example, within the work-based

investigation and training module at level 4 apprentices will be able to undertake negotiated work-based projects that build on work activities and integrate knowledge, skills, behaviours and values developed through higher education learning.

Alongside the assessed components of the programme, apprentices are encouraged to complete a portfolio of skills and competencies based on the Degree Apprenticeship Framework. This portfolio enables the apprentices to recognise the skills and abilities they have developed both through the programme of study and the work-based activities undertaken during their learning journey.

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 and critically evaluative practitioners. The balance between face-to-face lectures and directed study is detailed within the module specifications. Students will be encouraged, through classroom activities and assessments, to reflect on both their own and organisational behaviour in order to improve their performance as well as giving them the knowledge and confidence to contribute towards the development of their organisational performance.

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

Knowledge and Understanding

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

Intellectual Skills

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

Key Skills

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

VLE (Virtual Learning Environment)

Extensive use is made of Glyndŵr University's VLE, Moodle, to enhance the learning experience. Moodle is used by staff to provide information about the courses and individual modules, and as a repository of lecture notes and links to other sources of information.

In addition to the above learning and teaching strategies, apprentices are expected to demonstrate professional competencies and behaviour within the workplace. A three-way learning plan is agreed between employer, apprentice and University which will detail the on the job training and professional competencies detailed within the relevant apprenticeship framework. These will be reviewed as part of the progress update process every two months and is specific to the individual employer (such as working practices, company structure and processes, induction, and professional behaviour).

The personal/industry tutor will be responsible for gathering progress and behaviour information from the academic team and feeding this information into the progress update process. The notes from these meetings will be shared with relevant academic staff if they impact on any aspect of the teaching or learning required.

26 Work based/placement learning statement

Within the three-year part time apprenticeship programmes, students are expected to be in a relevant full-time position and to apply relevant learning to their work-place through applied projects and utilising real-world examples within their assessments.

Throughout the programme, applied projects and assignments are agreed in partnership with the employer and the apprentice to ensure that they enable improved productivity, innovation and business growth for each employer so that there is a clear return on investment for the employer and to ensure that the apprentice can evidence the required skills and competencies within their job role and for their organisation. In each academic year, at least 30% of the modules within the programme will be based on and assessed by the application and evaluation of real-world, work-place problems and their solutions.

Alongside the assessed components of the programme, apprentices are encouraged to complete a portfolio of skills and competencies based on the Degree

Apprenticeship Framework. This portfolio enables the apprentices to recognise the skills and abilities they have developed both through the programme of study and the work-based activities undertaken during their learning journey. This portfolio has no impact on the grades or qualifications gained at Glyndŵr University and students are able to graduate if not completed. Completion of the portfolio is required in order for the Welsh Government to issue the apprenticeship certificate. Students will be encouraged to complete the portfolio and this will be monitored throughout the programme.

27 Welsh medium provision

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

The University is committed to supporting its learners to use incidental Welsh during reviews and conversations relating to their programme as well as providing additional professional development opportunities to develop conversational and professional Welsh. The University has a number of Welsh speaking advisors/managers who can fully conduct the review process through the medium of Welsh. During the enrolment process and induction, this support is highlighted and resources are given to learners to encourage them to learn and use Welsh in the workplace.

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.

28 Assessment strategy

The programmes provide 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.

Formative assessment will be utilised in all modules to allow students to develop, improve and prepare for summative assessment. The form of this assessment will vary depending on the module and skills being developed. Some form of feedback will be provided. These formative opportunities and how feedback will be delivered will be explained to students at the start of the module and on module spaces.

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.

The achievement of the overall framework based on assessment of the qualification success and achievement of the relevant module learning outcomes in the credit and qualification aligned to the Degree Apprenticeship framework in Wales.

Consistent with the QAA expectations for Assessment of Students and the Recognition of Prior Learning in Wales, Degree Apprenticeships are required to comply with QAA expectations for assessment of taught provision and for the recognition of prior learning.

Assessment Methods

Formal Written Examinations

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

Coursework

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

Portfolio

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

Continuous Assessment

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

Case Study

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

Plagiarism

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

Feedback to students

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

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

In addition, progress review updates are required between employer, apprentice and provider no less than every 61 days. This ensures a near constant feedback and communication cycle during the delivery of the apprenticeship.

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

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

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

Module code & title	Assessment type and weighting	Assessment loading	Indicative submission date
ENG495 Analytical Engineering Techniques	50% Assignment 50% Exam	2500 Words 2Hr.	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG497 Electrical Engineering	50% Portfolio 50% Exam	2500 Words 2Hr.	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG499 Mechanical Engineering	50% Portfolio 50% Exam	2500 Words 2Hr.	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG496 Design & CAD	50% Coursework 50% Portfolio	2500 Words 1500 Words	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG498 Engineering Standard, Business & Operations Management	50% Report 50% Portfolio	2500 Words 2500 Words	Wk. 12, SEM 2 Wk. 12, SEM 3
ENG4AA Work Based Learning	25% Report 75% Portfolio	1200 3800	Wk. 12, SEM 2 Wk. 12, SEM 3
ENG5AB Computer Aided Engineering	50% In-class Test (MCQ) 50% Assignment	2Hr. 2500 Words	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG5AA Analytical Control Techniques	50% Coursework 50% Exam	2500 Words 2Hr.	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG5AJ Modern Manufacture, Sustainability & Industry 4.0	50% Report 50% Case Study	2500 Words 2500 Words	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG5AF Materials & Processes	50% Assignment 50% Exam	2500 Words 2Hr.	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG5AC Industrial Automation & PLCs	100% Portfolio	3500 Words	Wk. 12, SEM 2
ENG5AE Instrumentation & Condition Monitoring	50% Case Study 50% Portfolio	2500 Words 2500 Words	Wk. 12, SEM 1 Wk. 12, SEM 2

ENG5AD Industrial Project	10% Presentation 90% Report	15 min 5000 Words	Wk. 12, SEM 3 Wk. 12, SEM 3
ENG5AG Mechanical System Design	50% Case Study 50% Portfolio	2000 Words 2000 Words	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG5AH Mechatronics Application & Manufacturing Systems	50% Assignment 50% Assignment	2500 Words 2500 Words	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG5AK Power, Distribution & System Design	50% In-class Test 50% Case Study	2Hr. 2500 Words	Wk. 12, SEM 2 Wk. 12, SEM 2
ENG6AE Managing Workforce, Engagement & Commitment	60% Portfolio 40% Group Project	4000 Words 2000 Words	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG6AF Product Design	100% Portfolio	4000 Words	Wk. 12, SEM 2
ENG6AC Machine & Production System	50% Exam 50% Case Study	3 Hrs 2500 Words	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG6AB Industrial Communication System	50% Assignment 50% Exam	2500 Words 3Hr.	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG6AA Engineering Modelling & Simulation	50% Assignment 50% Assignment	2000 Words 2000 Words	Wk. 12, SEM 1 Wk. 12, SEM 2
ENG6AD Maintenance & Safety System	100% Portfolio	4000 Words	Wk. 12, SEM 2
ENG6AG Project	80% Report 20% Presentation	10,000 Words 10 min	Wk. 12, SEM 3 Wk. 12, SEM 3

29 Assessment regulations

Regulations for Bachelor Degrees, Diplomas, and Certificates 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%.

External Examiners should review and approve all coursework and examination papers which contribute to the overall degree classification and which contribute more than 30% to the overall module mark.

Failure may be compensated at the time of attempted level completion, **up to a maximum of 30 credits across all levels of the programme.** Major individual and group based project modules must not be compensated.

Non-credit bearing assessment

N/A

Borderline classifications (for undergraduate programmes only)

In considering borderline cases the Assessment Board shall raise the classification to the next level if all of the following criteria are met:

- At least 50% of the credits at level 6 fall within the higher classification.
- All level 6 modules must have been passed at the first attempt. (If failure has been compensated in accordance with Paragraph 10 above in respect of a Level 6 module, this module will not qualify as a pass at the first attempt and consequently, the borderline criteria will not be met);

The mark achieved for the level 6 Project module is within the higher classification.

Restrictions for trailing modules (for taught masters programmes only)

N/A

30 Programme Management

Programme leader

Martyn Jones
martyn.jones@glyndwr.ac.uk

Module Leaders

Module Title	Module leader
ENG495 Analytical Engineering Techniques	*M Kochneva*
ENG497 Electrical Engineering	*A Sharp*
ENG499 Mechanical Engineering	*O Durieux*
ENG496 Design and CAD	*N Vidmer*
ENG498 Engineering Standard, Business & Operations Management	*N Vidmer*
ENG4AA Work Based Learning	*T Mitchell*
ENG5AB Computer Aided Engineering	*M Jones*
ENG5AA Analytical Control Techniques	*M Kochneva*
ENG5AJ Modern Manufacture, Sustainability & Industry 4.0	*O Durieux*
ENG5AF Materials & Processes	*M Jones*
ENG5AC Industrial Automation & PLC	*Z Chen*
ENG5AE Instrumentation & Condition Monitoring	*Z Chen*
ENG5AD Industrial Project	*T Mitchell*
ENG5AG Mechanical System Design	*R Bolam*
ENG5AH Mechatronics Application & Manufacturing Systems	*M Soufian*
ENG5AK Power Distribution & System Design	*Y Vagapov*
ENG6AE Managing Workforce, Engagement & Commitment	*D Sparke*
ENG6AF Product Design	*R Bolam*
ENG6AC Machine & Production System	*O Durieux*

ENG6AB Industrial Communication System	*S Shoaib*
ENG6AA Engineering Modelling & Simulation	*S Monir*
ENG6AD Maintenance & Safety System	*F Mansour*
ENG6AG Project	*A Sharp*

Other positions of responsibility
The programme leader and module leaders will be responsible for the learning and teaching and assessment within the program. In addition, there are other positions of responsibility within the degree apprenticeship programmes. The student, industry mentor and workplace mentor will be required to engage with the 61 day review system.

Personal tutor
Each apprentice (student) will be appointed a personal tutor, who will be a member of the engineering programme team. They will provide pastoral and academic support for students throughout their academic studies.

Industry mentor
This will be a designated member of academic staff with experience within industry. They will provide support for the apprentice in relation to relationship between their academic studies and employment within industry. They will act as a link between the programme, individual students and their employers.

Workplace mentor
This is a non-academic member of staff. A mentor within the workplace of the apprentice will be appointed and will provide support for the student within the workplace and will communicate with the student, industry mentor and programme leader, as appropriate.

Work related learning unit
The relationship between the employer, apprentices and industry mentor is overseen by a member of the Work-Related Learning Unit within the Enterprise Office at WGU.

31 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 Faculty 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.

Individual Progress review updates are required no less than every 61 days as part of the Degree Apprenticeship Programme. This facilitates individual feedback from both employer and apprentice throughout the programme.

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 Faculty'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.

32 Research and scholarship activity

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

In the 2014 Research Excellence Framework (REF 2014), the Faculty's submission to the Computer Science and Informatics category received a grade point average of 2.04, with over two-thirds of all research scoring 2* or higher.

Academic Research

The University Research Centre for Faculty of Arts, Science & Technology 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 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 Faculty 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 several 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 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.

33 Learning support

Institutional level support for students

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

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

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

Faculty support for students

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

Programme specific support for students

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

- Students will 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.
    viii. Each apprentice is assigned an industry mentor who will support the apprentice and their employer to identify relevant and

appropriate projects as well as ensure that both the employer and apprentice needs are met.

ix. Tutorials/progress reviews are an embedded feature within the programme and will encourage the engagement of the employer within the programme ensuring an open three-way dialogue between the provider, employer and apprentice with regular feedback on technical and professional skills and competencies.

x. The relationship between the employer, apprentices and industry mentor is overseen by a member of the Work-Related Learning Unit within the Enterprise Office. This oversight provides an objective, non-academic and non-employer linked support facility for students.

xi. Where necessary the work-related learning unit will work with the employers to ensure that the employers are supported and trained to provide the best experience and support to their apprentices. The University provides complimentary mentoring, professional supervision and coaching courses to expand the skills of apprentice supervisors and managers to ensure that the learning that is applied to the workplace is effective and impactful.

34 Equality and Diversity

Glyndŵr University is committed to providing access to all students and promotes equal opportunities in compliance with the Equality Act 2010 legislation. This programme complies fully with the University's Equality and Diversity Policy https://www.glyndwr.ac.uk/en/AboutGlyndwrUniversity/EqualityandDiversity/ ensuring that everyone who has the potential to achieve in higher education is given the chance to do so.