PART TWO PROGRAMME SPECIFICATON

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

3 **Award title**

BEng (Hons) Industrial Engineering

4 **Final awards available**

BEng (Hons) Industrial Engineering

5 **Professional, Statutory or Regulatory Body (PSRB) accreditation**

Please list any PSRBs associated with the proposal

The programme has been developed in line with the Engineering Council Engineering Competence (UK-SPEC) standards such that the programme content structure, implementation, management and the learning outcomes adhere to the guidelines defined, as demonstrated with the module specifications and the curriculum matrix table, within.

The following is an extract from the QAA Subject Benchmark document, it can be seen that the UK-SPEC has implicitly been applied in order to meet the QAA requirements.

“This edition represents a minor revision to the 2010 version of the subject benchmark statement for engineering to encompass updates to the UK-SPEC in 2013 by the Engineering Council. Rather than reproducing the required learning outcomes from the UK-SPEC in full in the subject benchmark statement, readers are now directed to the document on the Engineering Council's website.

The UK-SPEC 2013 review has also presented an opportunity to make a small number of amendments to the main text of the subject benchmark statement for the purposes of clarification and factual updating.

Accreditation available

This programme is accredited by both the Institution of Engineering & Technology (IET) and Institution of Mechanical Engineers (IMechE). The programme contributes towards Engineering Council CEng professional registration.

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

6	JACS3 **code**	H190
7	UCAS **code**	N/A

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

QAA Subject Benchmark Statement Engineering (2015)

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**	Part time
11	**Language of study**	English

Office use only
Approved October 2016

12 Criteria for admission to the programme

Guidance - Entry requirements are in accordance with the University's admissions policy http://www.glyndwr.ac.uk/en/media/Media,49536,en.pdf

Standard entry criteria

UK entry qualifications	Choose an item.
International entry qualifications	*Qualifications outlined on the National Academic Recognition and Information Centre (NARIC) as equivalent to the UK entry qualification below.*

Programme specific requirements

For entry to Level 6 (top up) applicants must satisfy the entry criteria and admissions tutor by producing documentary evidence that they have achieved a qualification at level 5 or better in a relevant discipline and have the necessary background, having accumulated the equivalent of 240 HE credits. Admission to the programme may specifically be gained by students who can present evidence of one of the following:

i. Have passed a Dip HE in a relevant discipline.
ii. Have passed a Glyndŵr University FdEng in Industrial Engineering
iii. Have acquired 240 credits at levels 4 and 5 from other suitable and relevant HE studies. (bridging module may be necessary)
iv. Have passed a qualification from an EU or other overseas country equivalent, as defined as equivalent NARIC, to a Dip HE or better in a relevant discipline.

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

Other relevant qualifications or combination of relevant qualifications and industrial experience may be considered for admission on an individual basis. The Programme Leader can advise.

13 Recognition of Prior (Experiential) Learning

Programme specific requirements

Recognition of Prior Learning (RPL) or Recognition of Prior Experiential learning (RPEL) is not permitted for level six top-up programmes.

14 Aims of the programme

The key aim of the programme 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 programme

The BEng (Hons) Industrial Engineering 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 and work-based 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, process and management roles.

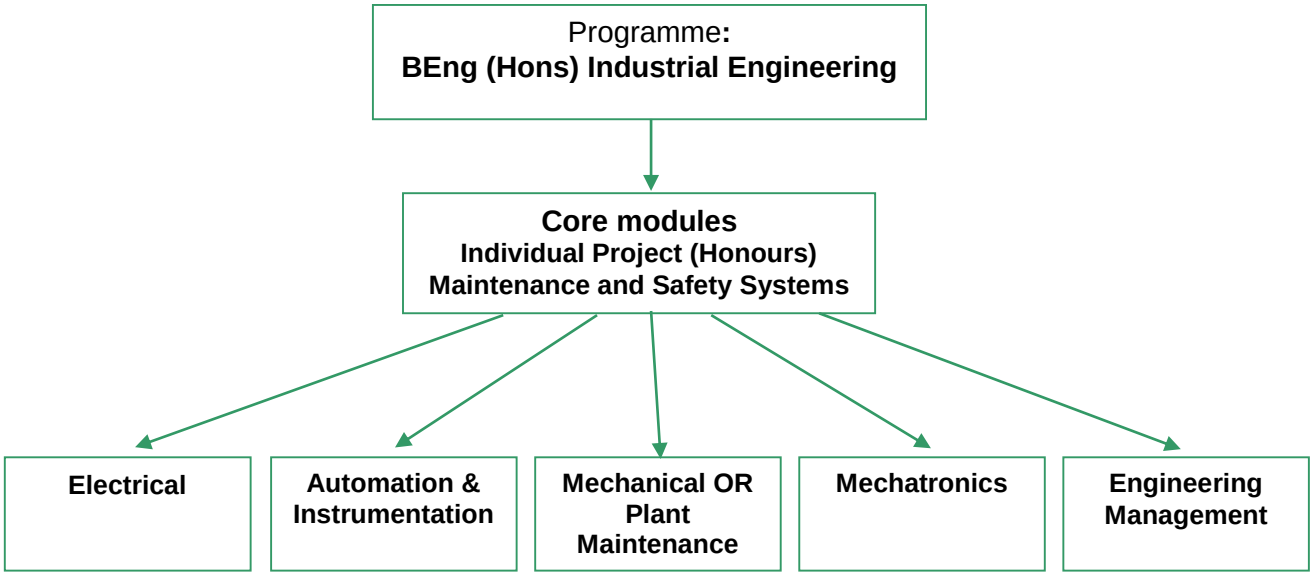
In the last academic year mechanical transmission system, automation equipment, smart sensors, process instrumentation and automation equipment have been donated by the Industry partners. We have also invested in the latest Profibus diagnostic equipment and Siemens Totally Integrated Automation platform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

16 Programme structure narrative

The BEng (Hons) Industrial Engineering Level 6 'top up' programme will be delivered on a part time day release basis, the duration of the will normally be one academic year. The award requires 360 credits of which 240 are from the FdEng Industrial Engineering programme, or qualifications deemed equivalent by the team. Students will start the programme at the September entry point. Day release taught modules will be delivered over three trimesters. Assessment Boards will take place in September.

17 Programme structure diagram

The BEng (Hons) Industrial Engineering programme has five routes: Electrical, Automation & Instrumentation, Mechanical OR Plant Maintenance, Mechatronics and Engineering Management. Each route consists of four 20 credit specialism modules, and one 40 credit Individual Project module.



BEng (Hons) Industrial Engineering Routes and Associated Modules				
Level six modules				
Electrical	**Automation & Instrumentation**	**Mechanical OR Plant Maintenance**	**Mechatronics**	**Engineering Management**
Individual Project (Honours)				
Maintenance and Safety Systems				
Power Electronics and Electric Drives		Engineering Modelling & Simulation		
Further Control Engineering	Industry 4.0	Product Design	Industry 4.0	Project and Manufacturing Operations Management
Industrial Communications Systems		Mechanical Systems Analyses	Mechatronic Applications	Managing Workforce, Engagement and Commitment

	Level Six					
Trimesters 1, 2 and 3	Mod title	Individual Project (Honours)	Mod title	Maintenance and Safety Systems	Mod title	Power Electronics and Electric Drives
	Mod code	ENG654	Mod code	ENG667	Mod code	ENG624
	New/Exist	Existing	New/Exist	New	New/Exist	Existing
	Credit value	40	Credit value	20	Credit value	20
	Core/Opt	Core	Core/Opt	Core	Core/Opt	Option
	Mod leader	Andrew Sharp	Mod leader	Fatima Mansour	Mod leader	Yuriy Vagapov

	Level Six					
Trimesters 1, 2 and 3	Mod title	Further Control Engineering	Mod title	Industrial Communications Systems	Mod title	Industry 4.0
	Mod code	ENG625	Mod code	ENG663	Mod code	ENG669
	New/Exist	Existing	New/Exist	New	New/Exist	New
	Credit value	20	Credit value	20	Credit value	20
	Core/Opt	Option	Core/Opt	Option	Core/Opt	Option
	Mod leader	Zheng Chen	Mod leader	James Robinson	Mod leader	James Robinson

	Level Six					
Trimesters 1, 2 and 3	Mod title	Engineering Modelling & Simulation	Mod title	Product Design	Mod title	Mechanical Systems Analysis
	Mod code	ENG668	Mod code	ENG666	Mod code	ENG658
	New/Exist	New	New/Exist	New	New/Exist	Existing
	Credit value	20	Credit value	20	Credit value	20
	Core/Opt	Option	Core/Opt	Option	Core/Opt	Option
	Mod leader	Shafiul Monir	Mod leader	Martyn Jones	Mod leader	Zheng Chen

	Level Six					
Trimesters 1, 2 and 3	Mod title	Mechatronic Applications	Mod title	Project and Manufacturing Operations Management	Mod title	Managing Workforce, Engagement and Commitment
	Mod code	ENG662	Mod code	ENG626	Mod code	BUS605
	New/Exist	New	New/Exist	Existing	New/Exist	Existing
	Credit value	20	Credit value	20	Credit value	20
	Core/Opt	Option	Core/Opt	Option	Core/Opt	Option
	Mod leader	Andrew Sharp	Mod leader	Nataliia Luhyna	Mod leader	Mike Green

18 Intended learning outcomes of the programme

Knowledge and understanding

	Level 6 Honours Degree
A1	Mathematical principles relevant to Industrial Engineering
A2	Industrial Engineering principles and applications
A3	The design process and construction methodology, demonstrating an awareness of environmental implications and the need for sustainable development;
A4	Current and future developments within Industrial Engineering

Intellectual skills

	Level 6 Honours Degree
B1	Apply electrical and electronic engineering/mechanical principles to the solution of design and operation problems
B2	Apply electrical and electronic engineering/mechanical principles to the solution of design and operation problems
B3	Analyse, evaluate and interpret engineering data
B4	Assess, interpret and implement decisions with an awareness of technical, economic and commercial implications

Subject skills

	Level 6 Honours Degree
C1	Conduct laboratory experiments to investigate engineering principles and properties of devices and systems
C2	Design, construct, test and evaluate devices and systems to meet given performance criteria, including the use of computer-based tools where appropriate
C3	Prepare descriptive, interpretive and evaluative technical reports
C4	Propose, plan, undertake and report a self-directed individual programme of investigation, design and implementation

Professional and Employability Skills

	Level 6 Honours Degree
D1	Communicate effectively in writing, verbally and through graphical representations
D2	Use information technology competently - to source information, to prepare reports, to model performance using specialised software packages
D3	Evaluate and reflect on own performance and self-management
D4	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	**Core /opt**	**A1**	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**	**C1**	**C2**	**C3**	**C4**	**D1**	**D2**	**D3**	**D4**
Product Design	opt			✓	✓	✓	✓	✓			✓	✓		✓	✓		
Power Electronics and Electric Drives	opt	✓	✓	✓	✓					✓		✓			✓		
Individual Project (Honours)	core	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Maintenance and Safety Systems	core	✓	✓		✓	✓		✓	✓			✓		✓			
Engineering Modelling & Simulation	opt	✓	✓					✓		✓	✓	✓		✓			
Further Control Engineering	opt	✓	✓	✓	✓			✓			✓				✓		
Project and Manufacturing Operations Management	opt			✓	✓		✓				✓			✓		✓	✓
Mechanical Systems Analysis	opt	✓	✓	✓	✓	✓				✓		✓			✓		
Mechatronic Applications	opt	✓	✓	✓	✓	✓				✓		✓			✓		
Managing Workforce, Engagement and Commitment	opt			✓	✓				✓					✓		✓	✓
Industrial Communication Systems	opt	✓	✓		✓	✓		✓				✓			✓		
Industry 4.0	opt				✓			✓	✓		✓	✓			✓		

20 Learning and teaching strategy

The learning and teaching strategy has been developed within Glyndŵr University's Teaching and Learning Framework, the QAA Subject Benchmark statement for Engineering (2015), the QAA UK Quality Code for Higher Education (2014) and the QCA (Qualifications and Curriculum Authority).

Students will be encouraged, through classroom activity and assessments, to reflect on their own practice and organisational practice in order to improve their own performance as well as giving them the knowledge and confidence to contribute towards the development of organisational performance and improvement.

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 accommodates this.
4. 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 practice problem solving skills. This will also allow students to evaluate the appropriateness of different approaches to solving problems.
- 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.

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), and methodology or by calculation. Reflective self-evaluation forms part of this. Critical evaluation is encouraged via debate and discussion in the tutorials.

Transferable Skills
Transferable 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 key 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 most 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

Not applicable.

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, 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. In all cases, group assessment will account for no more than 20% of the overall module assessment.

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, while 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.

Examination

This is a formal examination which is organised centrally within Glyndŵr University. It is usually an 'unseen' paper sat in an invigilated environment. An exception to the unseen element is when a case study is required for reference. Feedback of results are not given until after an official assessment board.

A typical examination will have a number of questions set, for example five, of which the student is required to answer three. This is called a 'long answer' examination.

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.

Module code & title	Assessment type and weighting	Assessment loading	Indicative submission date
Product Design ENG666	*Portfolio 100%*	*4000 Words*	*Week 12 Trimester 3*
Power Electronics and Electric Drives ENG624	*Examination 100%*	*3 Hours*	*Week 8 Trimester 3*
Individual Project (Honours) ENG654	*First Project Presentation 5%* *Interim Report 15%* *Final Project Presentation & Poster presentation 20%* *Final Project Report 60%*	*Report 10000 words*	*Week 11 Trimester 1* *Week 11 Trimester 1* *Week 13 Trimester 3* *Week 14 Trimester 3*
Maintenance and Safety Systems ENG667	*Portfolio 100%*	*4000 Words*	*Week 12 Trimester 3*
Engineering Modelling & Simulation ENG668	*Coursework 50%* *Coursework 50%*	*2000 Words* *2000 Words*	*Week 11 Trimester 1* *Week 12 Trimester 2*
Further Control Engineering ENG625	*Coursework 50%* *Examination 50%*	*2000 Words* *2 Hours*	*Week 11 Trimester 2* *Week 8 Trimester 3*
Project and Manufacturing Operations Management ENG626	*Portfolio 100%*	*3000 Words*	*Week 12 Trimester 3*
Mechanical Systems Analysis ENG658	*Coursework 50%* *Examination 50%*	*2000 Words* *2 Hours*	*Week 11 Trimester 2* *Week 8 Trimester 3*
Mechatronic Applications ENG662	*Portfolio 80%* *Presentation 20%*	*3500 Words* *20 minutes*	*Week 12 Trimester 3* *Week 12 Trimester 3*
Managing Workforce Engagement & Commitment BUS605	*Assignment 50%* *Case Study 50%*	*2500 Words* *2500 Words*	*Week 3 Trimester 3* *Week 3 Trimester 3*
Industrial Communication Systems ENG663	*Practical 50%* *Report 50%*	*2000 Words* *2000 Words*	*Week 12 Trimester 2* *Week 12 Trimester 3*
Industry 4.0 ENG669	*Coursework 60%* *Case Study 40%*	*2500 Words* *1500 Words*	*Week 12 Trimester 3* *Week 12 Trimester 3*

24 Assessment regulations

Regulations for Bachelor Degrees, Diplomas, Certificates and Foundation Degrees

Derogations

A derogation from regulations has been approved for this programme for the following:

7.0 The pass mark for a module assessment is 40%, and each element of assessment (where there is more than one assessment) requires a minimum mark of 30% for the module to be passed overall.

This is to meet professional body requirements.

Non-credit bearing assessment

N/A

Borderline classifications (for undergraduate programmes only)

Requirement for raising classification in borderline cases:

- 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.

In considering borderline cases, in addition to the requirements detailed in the Academic Regulations, the mark achieved for ENG654 Individual Project (Honours) must be within the higher classification in order for the Assessment Board to raise the classification to the next level.

Restrictions for trailing modules (for taught masters programmes only)

N/A

25 Programme Management

Programme leader

Reg Holme

Programme team

Zheng Chen
Robert Bolam
Fatima Mansour
James Robinson
Andrew Sharp
Bobby Manesh
Dr Yuriy Vagapov
Natalija Vidmer

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.

The Programme team meet monthly in order to monitor programme performance. Issues discussed include recruitment and retention, student feedback, industry partner's feedback, assessment calendars approaches to teaching and learning, laboratory requirements, and guest lecture plans. Peer observation is undertaken and

this includes classroom based observation as well as peer review of marking, assessment and feedback.

The external examiner's feedback and comments are discussed by the team and the response is included in the AMR which is produced by the programme leader. This is formally presented to and discussed at discussed at Academic Subject Boards and then submitted to Academic Programmes Sub-committee

Module management

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

Feedback will be provided to students in the following ways:

- Minutes and responses to SSCC's will be posted on the VLE.
- External Examiner reports and any associated actions arising will be presented to students in the November SSCC.
- An overview of the draft AMR and associated actions will be presented to the SSCC in November.
- An update on achievement of AMR Action plans will be provided in the March SSCC.

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 Programme Team 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 industries training managers, chief engineers, factory/site managers and regional managers. This gives them the opportunity to voice their views relating to their employees progress, along with any problems or issues. Also, the company's current and future training needs can be discussed and developed. Regular site visits are undertaken by the work based learning mentor (and sometimes programme leader).

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 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)

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

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

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

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

Non Linear Processes with deadtime: 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 deadtimes. Implementing predictive control schemes using mathematical models of the process, incorporating deadtime 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 the support for students as:

- Library & IT Resources
- The Assessment Centre
- DisAbility Support Team
- Irlen Centre
- Careers Centre and Job Shop
- Zone Enterprise hub
- Chaplaincy
- Counselling & Wellbeing
- Student Funding and Welfare
- International Welfare
- Student Programmes Centre
- Glyndŵr Students' Union

School support for students

All students 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 SSCC 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.