PROGRAMME SPECIFICATION

Awarding body/institution	Glyndŵr University
Teaching institution(if different from above)	
Details of accreditation by a professional, statutory or regulatory body(including link to relevant website)	IET (Institution of Engineering and Technology) http://www.theiet.org/ IMechE (Institution of Mechanical Engineers) http://www.imeche.org/Home
What type of accreditation does this programme lead to?	The course leads to CEng (Chartered Engineer) where the IET and IMechE are the accrediting bodies
Is accreditation in some way dependent on choices made by students?	Yes The IET accredit /grant CEng status for the Automation, Mechatronics and Electrical routes. The IMechE accredit /grant CEng status for the Mechanical and Plant Maintenance routes.
Final award/s available	Bachelor of Engineering with Honours
Award title	Bachelor of Engineering with Honours In Industrial Engineering
JACS 2 code	H190
UCAS code(to be completed by admissions)	
Relevant QAA subject benchmark statement/s	QAA Subject benchmark statement for Engineering (2010)
Other external and internal reference points used to inform the programme outcomes	Engineering Council UK-SPEC revised 2010 (UK Standard for Professional Engineering Competence) SEMTA (Sector Skills Council for Science, Engineering and Manufacturing Technologies)
Mode/s of study	Part time day release Full time
Language of study	English
Date at which the programme specification was revised	04/09/2013

Criteria for admission to the programme

Recruitment and admission procedures remain in line with the University's Regulations for Bachelor Degrees, Diplomas, Certificates, and Foundation Degrees. Applicants normally attend an interview as part of the selection process. During the interview process the admissions tutor assesses academic ability (previous qualifications) and student expectations, as well as professional experience. The interview process also allows us to ensure that all prospective students are aware of the demands of the programme.

The entry requirements for this programme are as follows:

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:

(a) Have passed a Glyndŵr University FdEng in Automation, Instrumentation and Control or Plant Maintenance Operations or Industrial Engineering

(b) Or: Equivalent qualifications of a European or overseas country referenced against NARIC.

(c) Or: Suitability of qualifications and / or experience not listed above will be otherwise determined on a case by case basis at interview.

International and European applicants will be expected to have attained IELTS 5.5 or a recognised equivalent that can be certified by their last or current place of study.

Aims of the programme

The programme aims to develop the intellectual and application skills of the student 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.

Distinctive features of the programme

The BEng (Hons) Industrial Engineering top-up 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 that are crucial to maintaining efficiency in a competitive world market.

Engineering industries have had a huge 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. Additionally, scheduling of delivery and assessment has been influenced by student feedback, as has the theory/principles, practical laboratory work and work based learning been balanced better following discussions with academics, students and industry.

The Engineering Laboratories have had nearly half a million pounds invested in equipment this year.(2012/13) This complements industrial equipment donations and further support in terms of funding major projects to the value of one hundred thousand pounds, in some cases .All of which enhance the student experience, as they are dealing with industrial standard equipment and facilities and not just 'educational training aids/equipment'.

Programme structures and requirements, levels, modules, credits and award

Top Up

The term 'top up' refers to 120 HE credits at level six which are combined with another 240 HE credits previously acquired from levels four and five, to provide a BEng Hons qualification. In this proposal the 240 credits are likely to have been acquired through an FdEng programme and many students (and the sponsoring employers) have shown an interest in further developing their education/qualifications.

The above identifies the initial 'intent' of the proposed programme, however it became apparent that other industries and students showed a keen interest in the proposal and would wish to participate. The programme team have considered these requests and have concluded that if a student's background and existing qualifications are suitable (see admission criteria) then the student should not be excluded from the programme.

Thus the proposal is also to widen participation to include students who have completed levels four and five of a suitable BEng Hons programme and wish to transfer to this 'top up' programme. In addition to this and so as not to unnecessarily preclude students, the programme will be offered both full and part time as some students are currently full time as a secondment from their company.

BEng (Hons) Industrial Engineering Routes and Associated Modules			
Automation & Instrumentation OR Electrical	**Mechanical OR Plant Maintenance**	**Mechatronics**	**Engineering Management NEW**
Project and Manufacturing Operations Management. ENG626	Project and Manufacturing Operations Management. ENG626	Project and Manufacturing Operations Management. ENG626	Project and Manufacturing Operations Management. ENG626
Plant & Maintenance Systems Analysis ENG627	Plant & Maintenance Systems Analysis ENG627	Plant & Maintenance Systems Analysis ENG627	Plant & Maintenance Systems Analysis ENG627
Project ENG629	Project ENG629	Project ENG629	Project ENG629
Further Control Engineering ENG625	Further Control Engineering ENG625	Further Control Engineering ENG625	Inter-professional Studies in Engineering ENG603
Electrical Power Systems and Drives ENG624	Mechanical Systems Analysis ENG658	Mechatronics and Industrial Engineering ENG659	Managing Workforce, Engagement and Commitment BUS605

Module Title	Core/ Option	Level	Module Code*	Credit Value	Semester delivery	Module Leader
Project and Manufacturing Operations Management.	core	6	ENG626	20	1-2	P Storrow
Plant & Maintenance Systems Analysis	core	6	ENG627	20	1-3	R Holme
Project	core	6	ENG629	40	1-3	R Holme
Further Control Engineering	Option	6	ENG625	20	1-2	Z. Chen
Electrical Power Systems and Drives	Option	6	ENG624	20	1-2	Y. Vagapov
Mechanical Systems Analysis	Option	6	ENG658	20	1-2	Z. Chen
Mechatronics and Industrial Engineering	Option	6	ENG659	20	1-2	B. Klaveness
Inter-professional Studies in Engineering	Option	6	ENG603	20	1-2	D Sprake
Managing Workforce, Engagement and Commitment	Option	6	BUS605	20	1-2	Mike Green

Intended learning outcomes of the programme

The programme provides opportunities for learners to achieve the following outcomes:

A) Knowledge and understanding:

Students will achieve knowledge and understanding of …

A.1 Mathematical principles relevant to Industrial Engineering;
A.2 Industrial Engineering principles and applications;
A.3 The design process and construction methodology, demonstrating an awareness of environmental implications and the need for sustainable development;
A.4 Current and future developments within Industrial Engineering.

B) Intellectual skills:

Students will be able to…
B.1 Apply electrical and electronic engineering/mechanical principles to the solution of design and operation problems;
B.2 Plan, conduct and report on a programme (project) of original work;
B.3 Analyse, evaluate and interpret engineering data;
B.4 Assess, interpret and implement decisions with an awareness of technical, economic and commercial implications.

C) Subject and Practical skills:

Students will be able to…
C.1 Conduct laboratory experiments to investigate engineering principles and properties of devices and systems;
C.2 Design, construct, test and evaluate devices and systems to meet given performance criteria, including the use of computer-based tools where appropriate;
C.3 Prepare descriptive, interpretive and evaluative technical reports.

D) Professional Skills and abilities and Employability Skills and abilities:

Students will be able to…
D.1 Communicate effectively in writing, verbally and through graphical representations;
D.2 Use information technology competently - to source information, to prepare reports, to model performance using specialised software packages;
D.3 Evaluate and reflect on own performance and self management;
D.4 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.

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**	**D1**	**D2**	**D3**	**D4**
Project and Manufacturing Operations Management.	core						✓		✓				✓	✓	✓	✓
Plant & Maintenance Systems Analysis	core	✓	✓		✓	✓		✓	✓			✓	✓			
Project	core	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		
Further Control Engineering	opt	✓	✓	✓	✓			✓			✓			✓		
Electrical Power Systems and Drives	opt	✓	✓	✓	✓	✓				✓		✓		✓		
Mechanical Systems Analysis	opt	✓	✓	✓	✓	✓				✓		✓		✓		
Mechatronics and Industrial Engineering	opt	✓	✓	✓	✓	✓				✓		✓		✓		
Inter-professional Studies in Engineering	opt			✓	✓				✓				✓		✓	✓
Managing Workforce, Engagement and Commitment	opt			✓	✓				✓				✓		✓	✓

Duration

The duration for full time students would be over two semesters starting each September. The award board would be in conjunction with other full time students, usually July, with re-sits /resubmission of referred work being due early September. i.e. standard – same as most other full time students.

The part time route would be spread over a longer period and could entail the completion of a bridging unit (see below). The programme team and admissions tutor would examine previous learning content in order to determine if the bridging unit were required.

The part time programme itself would be spread over twelve months – September to August, with the delivery pattern as explained below.

Referred work or re-sits for part time students would have to align with the following year's delivery, thus depending upon which module, this work may go to a December exam board or the following July exam board.

Bridging Module

The 20 credit bridging module (Analytical Control Methods) consists of Level Five BEng content which is very analytical and consists of mathematical principles used in traditional theory. The FdEng IE consists of content that is more applied and practical, with an emphasis on work based learning and development (as intended). Thus there is a gap in the theoretical knowledge attained by the FdEng students *IF* progression onto BEng IE is required. Thus the bridging module has been incorporated into the scheme in order to ensure that students are fully prepared for Level Six study. There may be other instances where it would be necessary for students to take the bridging module. This will be considered on an individual basis by the Admissions Tutor.

The module will be delivered concurrently with our provision of the FdEng IE programme, thus ensuring staff and facilities availability. The module specification is attached as an appendix.

Delivery Schedule

There are two modes of delivery; part time and full time, It is anticipated that the full time provision route would be taken by students who had previously completed levels 4 and 5 of a suitable BEng Hons programme. The necessity for the bridging module in these instances would be determined by the Admissions Tutor on an individual basis. The full time mode of delivery will follow the standard two semester pattern, as with other full time BEng programmes.

Part time

In order to cover the necessary content and learning into a single year, part time, it is necessary that the programme extends into the summer months, both in front of, and after the normal semesters. This will entail the following:

- Pre course - for bridging module (if necessary)
- Starting September three twenty credit modules completed over two semesters.
- Project, work based, forty credits, starts September to run through for twelve months
- Third semester twenty credit module, this will be delivered during the summer school.

<table>
<tr><th>pre course</th><th>Trimester One</th><th>Trimester Two</th><th>Trimester Three</th></tr>
<tr><td rowspan="3">Bridging Module (Normally to be taken by FdEng IE students)</td><td colspan="2">Project and Manufacturing Operations Management</td><td rowspan="3">Plant & Maintenance Systems Analysis</td></tr>
<tr><td colspan="2">Option 1:
Further Control Engineering
OR
Inter-professional Studies in Engineering</td></tr>
<tr><td colspan="2">Option 2:
Electrical Power Systems and Drives
OR
Mechanical Systems Analysis
OR
Mechatronics and Industrial Engineering
OR
Managing Workforce, Engagement and Commitment</td></tr>
<tr><td colspan="3">Project (over twelve months)
(40 credits)</td></tr>
<tr><td colspan="4"></td></tr>
</table>

Learning and teaching strategy used to enable outcomes to be achieved and demonstrated

Overview

The learning and teaching strategy has been developed within Glyndŵr University's Teaching and Learning Framework, the QAA Subject Benchmark statement for Engineering (2010), The QCA (Qualifications and Curriculum Authority).

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 practice application of knowledge and encourages students to become reflective practitioners. The balance between class contact / formal teaching and directed study is detailed within the module specifications. Students will apply their learning to the work place and will be encouraged, through classroom activities 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.

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, other skills (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 and commercial implications are also included 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 - by computer, methodology or by calculation - and evaluation of an implementation. Reflective self-evaluation forms part of this. Critical evaluation is encouraged via debate and discussion in the tutorials.

Transferable/key 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 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.

Moodle can also be used for some types of assessment and to communicate with individual students or groups. For example we have developed several on-line Quizzes, which are used for formative assessment during module delivery, as practice for formal in-course tests, and also in some cases for summative tests, replacing traditional paper based examinations. These are used where appropriate to supplement the more traditional forms of assessment.

Feedback from our current students suggests that they find Moodle very useful as a learning aid and the quizzes help maintain motivation during the course and for revision etc.

This is particularly useful with part time students, who only have limited access to PC's and the intranet during their attendance because of the intensive nature of their contact hours. Moodle is available virtually 24/7 from any internet enabled PC, so this allows them to preview material before attending, and review lecture and supplementary notes afterwards, as well as being able to submit work and receive feedback outside of day of release.

Use of Moodle also replaces traditional paper 'hand-outs' (in a lot of cases), meaning students cannot lose them, and are able to access them on-demand from a laptop/ipad etc. This allows them to revisit course materials, follow up internal and external links, tutorial examples and revision notes etc. Several e-books are available via Moodle, and there is access to a large resource of video and other materials particularly to support Mathematics and allied subjects.

Year tutors and programme leaders also use Moodle to disseminate support materials, such as student handbooks, notices relating to the course, assignments, examination information and past papers, revision material, information relating to professional institutions, visiting lecturers, out of hours or special events, etc.

Practical Implementation

Wherever possible, practical elements of the modules are implemented to support the principles and theoretical aspects of the subject content. This may be achieved in a number of ways such as, completing tasks in the student's workplace, tutorial demonstrations, laboratory exercises and assessed practical work.

Welsh Medium

Whilst students are entitled to submit assessments in Welsh, the programme is delivered in English.

Assessment strategy used to enable outcomes to be achieved and demonstrated

Assessment Methods:

Formal Exam

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

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 his/her own time and under his/her 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 – 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 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 Studies

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. Very often the student is given three or four scenarios to consider simultaneously, thereby enabling comparison of advantages and disadvantages.

Assessment regulations that apply to the programme

Academic Regulations for Bachelor Degrees, Diplomas and Certificates and Foundation Degrees apply to this programme.

Indicative Assessment Schedule Table

There follows two tables, one for part time and one for full time modes of study, relating to the type and timing of assessments. As the delivery schedule for both modes of study has been aligned to a certain extent, so too can the assessment schedule. This means that Exams occur only once (disregarding resits) and alleviates the necessity for multiple exam papers. The Plant & Maintenance Systems Analysis module, occurs during July (second summer school), it was considered that students would need further time to complete assignment /case study work, thus a submission date at the end of August should suffice.

Indicative Assessment Table Part time
(Grey cells – option modules)

Module Title	Assessment Method/s	Assessment Submission/exam
Project and Manufacturing Operations Management.	Continuous Assessment 100%	Sept - May
Plant & Maintenance Systems Analysis	Case studies and assignments totalling 100%	July - August
Project	Continuous Assessment 100% (inclusive of reports logbooks and presentations)	Sept - August
Further Control Engineering	Portfolio of activity evidence 50% Exam 50%	March May
Electrical Power Systems and Drives (option)	Assignment 50% Exam 50%	April May
Mechanical Systems Analysis (option)	Coursework 50% Exam 50%	April May
Mechatronics and Industrial Engineering (option)	Portfolio 50% Presentation 50%	April May
Inter-professional Studies in Engineering	Portfolio (inc meetings) 40% Group Project 50% Log 10%	Jan April May
Managing Workforce, Engagement and Commitment	Assignment 50% Case study 50%	Dec May

Indicative Assessment Table Full time

Module Title	Assessment Method/s	Assessment Submission/exam
Project and Manufacturing Operations Management.	Continuous Assessment 100%	Sept - May
Plant & Maintenance Systems Analysis	Case studies and assignments totalling 100%	Sept - May
Project	Continuous Assessment 100% (inclusive of reports logbooks and presentations)	Sept - May
Further Control Engineering	Portfolio of activity evidence 50% Exam 50%	March May
Electrical Power Systems and Drives (option)	Assignment 50% Exam 50%	April May
Mechanical Systems Analysis (option)	Coursework 50% Exam 50%	April May
Mechatronics and Industrial Engineering (option)	Portfolio 50% Presentation 50%	April May
Inter-professional Studies in Engineering	Portfolio (inc meetings) 40% Group Project 50% Log 10%	Jan April May
Managing Workforce, Engagement and Commitment	Assignment 50% Case study 50%	Dec May

Programme Management

Programme Team

Reg HOLME Programme Leader
David SPRAKE
Barrie BIRMINGHAM
Steve BYRNE
Olivier DURIEUX
Dr Richard GRANT
Brian KLAVENESS
Phil STORROW
Dr Yuriy VAGAPOV
Frank WELCOMME
Dr Zheng CHEN

Quality Procedures & Management

The programme team will meet at monthly intervals to discuss items relating to the provision of the programme. Typically, items for discussion would be similar to other Engineering programmes, such as: assessment plans/schedules, student achievement, retention, future recruitment, synchronising timing of delivery, Lab facilities/improvements/requirements, other resources, problems, special circumstances and disability issues, administration etc.

Each module within the programme will have a centrally located file, within which will be all documentation relating to that module. Typically this will include; module specification, scheme of work, assessment plan, assessments, internal verification for assessments, internal moderation/second marking for assessments (when completed) and archived annual monitoring reports (AMR).

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.

Existing arrangements for quality assurance will apply to the programme. The following annual quality assurance mechanism will operate for the programme:

- Annual Monitoring Report (AMR)
- Issues raised in external examiner reports are referred to Academic Subject Boards for further action, particularly when quality or resource issues are a concern;
- The capture and use of formal and informal student feedback and its interpretation is embedded in the AMRs and discussed;
- External examiners comments are responded to and this response is included in the AMRs for each programme;
- A Plenary session is held for the Institute to feedback on the overall quality of the AMR's.

Feedback to students

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

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

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

Feedback From students

Student Representatives Will be appointed to the Programme Team to provide a student input. Where complaints need to be aired, the student representative can act as a communication channel and thus avoid personalising any difficulty. He / she will also be able to bring urgent matters to the Programme Leader's attention by a direct approach.

Personal Tutor Each student has a member of staff allocated as their personal tutor. The student may meet their tutor at a mutually convenient time, to ask for advice, give the staff feedback or obtain any other general help they might require.

Student Perception of Course and Modules forms – SPOC and SPOM are a formal method of obtaining the student views. These forms are completed anomalously and help the staff identify the good aspects (from the students point of view) of the programme/modules and the areas that they think needs improvement. The staff analyse the results and summarise the consensus.

Staff Student Consultative Committee
Student views are gained anonymously by a senior person from another department who chairs an open meeting of a section of the student body within Engineering (similarly for other departments). The feedback obtained is formally recorded. Copies of the minutes are given to the class representative to disseminate the information back to the group. The points arising are then discussed at departmental level and information is fed back to programme team meetings and issues minuted. If the matter cannot be resolved at this level, issues are referred to other meetings such as Subject Team meetings or to the Subject Board. and on to Senate or its sub-committees if necessary.

Industrial Meetings. Regular meetings take place with industry's training managers, chief engineers, factory/site managers and regional managers. This gives them the opportunity to voice their views relating to their employees/students 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.

Research and Scholarly activity underpinning the curriculum

Academic Research

The Department of Engineering and Applied Physics has set up the Engineering Research Centre under the direction of Dr Zoubir Zouaoui. This is based on a long-established 'research group' structure, with Research Centre membership comprising ten lecturers drawn from all disciplines in the Department together with researchers and visiting professors from other universities. Research Centre members are all qualified in and have previous experience of academic research.

Examples of relevant research papers that have informed module content:
Building Fuzzy Model for Machining Process via Genetic Algorithm, submitted to IET Control Engineering Practice, contributes to the AI module (Automation and Instrumentation) Both fail-silent behaviour of permanent magnet synchronous drives with field oriented control. *World Journal of Engineering* and Off-line estimation of squirrel cage induction motor parameters using a step voltage 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 (i) individual consultancy to solve specific problems, (ii) the use of government-funded KTPs to develop longer-term projects and (iii) the generation 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/knowledge 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, Maintenance and Functional Safety module.

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 – 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.

Particular support for learning

Student Support

General Support. Students undergo an induction, which familiarises them with locations and facilities – inclusive of library, student services, sports hall, etc. The University rules and regulations are explained along with procedures, such as sickness, extenuating circumstances etc. Also, students are advised of the 'open door policy'.

Personal Tutor. Shortly after enrolment, a personal tutor will be allocated to the student. This will be a member of staff with whom the student feels comfortable and who will act as the first point for assistance when the student is unhappy or in difficulty. This will cover more general problems rather than module subject matter. This role is a key element in the implementation of a student's PDP (Personal Development Plan).

Module Tutors. If difficulty is experienced relating to the academic content of a module then staff are willing to provide advice, or even individual tutorials, to assist.

Student Counsellor. When students experience difficulty beyond the scope of the programme staff to deal with, such as financial or domestic difficulties, there are trained counsellors within the University who can provide support. The counsellor can also act as an independent point of contact if the student is uncomfortable with approaching programme staff.

Information and Student Services (**ISS)** The ISS is a 'one-stop' provision incorporating the library, IT facilities, careers advice, student loans and student counsellors. By calling at the Help Desk the student will be directed towards the most suitable source of advice.

Learning Resources

The available learning resources include the following:

- Several lecture theatres (ranging from 50 to 200 seats) are available around the campus – all being equipped with video, computer and projection facilities;
- IT facilities, inclusive of a number of computer Labs with dedicated engineering software available;
- Library facilities which include numerous new books which have been purchased over recent years to ensure current developments are incorporated into the programmes. There is a large collection of video and DVD material available, for both use within lectures and for students to loan. In addition, there are several relevant journals and periodicals which are maintained by the library;
- A number of general purpose laboratories exist and are equipped for multifunctional purposes;
- A number of specialist laboratories exist such as:
  - Automated Testing Facility
  - Process Control Rig inclusive of VSDs (drives)
  - PCB manufacturing
  - Electrical power, machines and distribution
  - Materials Testing

- Thermo Fluids
- Automation, inc. PLCs and SCADA

The above are particularly relevant to this programme and have recently undergone substantial investment.

£100,000 has been invested by United Utilities on equipment to build our process control rig. Also, Siemens UK supplied us with £60,000 of equipment and software for £6,000. ABB have supplied two flow meters free of charge (worth about £2,000).

Equality and Diversity

The admissions process adheres to Glyndŵr University's published policies on Equal Opportunities and Student Disabilities.

Ensuring all areas of the programme (including assessments) are accessible to students on the programme supports equality and inclusion. Recognising the requirements of current regulations and legislation in relation to the Equality Act 2010 all information that is produced for students will use plain language that is free from bias.

Where deemed appropriate by the Programme Leader and individual's consent, staff are alerted to student disabilities and given advice/direction on adaptations that maybe required in relation to teaching, learning, and assessment methods.

Students who present with a specific learning requirement are referred to Student Services where they can be formally assessed and the appropriate support can be implemented. The range of support that is available to individuals ranges from one-to-one tutor support to specialist equipment and software.