glyndŵr
PRIFYSGOL GLYNDŴR WRECSAM
GLYNDŴR UNIVERSITY WREXHAM

HNC Electrical & Electronic Technology
HND Electrical & Electronic Technology
HNC Mechanical Technology
HND Mechanical Technology

Glyndŵr University

Part Time Day Release

Glyndwr University regulations for BTEC Higher National Qualifications apply to these programmes

September 2010

Implementation dates:

Level 4	September 2010
Level 5	September 2010

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Contents

1. INTRODUCTION

The programmes are designed in consultation with industries within the catchment area to address current educational needs for apprentice technicians and time served technicians employed in North Wales industries from Anglesey and Llyn in the west to Deeside and Wrexham in the east. Employees from Wirral, Cheshire and Shropshire are also represented in increasing numbers. The HNC programmes have been growing year on year at Wrexham and at the franchised sites at Deeside College and Coleg Menai. This year the renewed interest in HNDs has manifested itself in the recruitment of 18 students at Coleg Menai on to the HND programmes. There has been a total first year intake across the three sites of over 100 which is a 20% increase on last year.

The programmes are split into broad churches which have been identified as meeting the needs of surrounding industries. The mechanical programme has a manufacturing bias whilst the electrical programme has three second year options enabling specialisations in Instrumentation, Electronics and Power, which reflect demand in the three centres. The first year curricular content is common and the options are 'flavoured' by the insertion of a specialist module in the second year with all other second year modules being common across the piece. Thus at Glyndŵr the Instrumentation & Control module is used, at Deeside the Electronics module and at Coleg Menai the Electrical Power module.

The intention of this proposal is to facilitate the replacement of current HNC and HND programmes in Electrical & Electronic Technology and Mechanical Technology with programmes which both address changes in technology that have taken place during the period of validity of the current programmes.

The current programme management structure has evolved from there being separate programme managers for electrical and mechanical at the time of the original validation. At the time of validation there were no franchise arrangements. The franchise agreements were made twelve months after the programme validation. To ensure consistency across the programmes and the franchise partners, a single programme leader for both programmes was appointed. A single programme leader will take responsibility for the electrical and mechanical programmes at Glyndŵr together with the franchised electrical and mechanical programmes. It is envisaged that in terms of course management the status quo will obtain and that at Glyndŵr the staffing of the provision will draw upon expertise from within the disciplines. No changes to the staffing arrangements at the franchised centres are envisaged.

The demand by industry for HNCs and HNDs continues to be strong with a total cohort across the three sites exceeding 200 students taught by means of day release. HNDs being offered at Coleg Menai on a part time basis using APL to convert HNCs and presently 18 students are converting HNCs to HND in both electrical and mechanical cohorts. Coleg Menai currently runs National Diploma (ND) classes on a full time basis and staff intend running full time HNDs to which the full time ND students may progress. The HNC numbers at Coleg Menai are approximately 80 across the two programmes. At Deeside there are approximately 55 across the two programmes and at Glyndŵr 45.

2. CURRICULUM DEVELOPMENT

A Higher National programme is worth 150 credit points necessitating a 10 credit module. Each programme consists of 120 credits (6x20) at level 4 and 30 credits (1x20 & 1x10) at level 5. There will be a sharing of some between the two programmes, particularly at level 4, so that only 240 credits in total will be delivered in each academic year across the two HN

programmes and levels. Any option module will only be delivered if there is sufficient demand. The HNCs are a good example of minimal use of optional modules. At Coleg Menai the optional modules used to convert the HNC to HND in both electrical and mechanical options are reflective of local industrial demand.

The HNC has provided a significant number of students for the part time B.Eng degree. Between 35% and 45% of those successfully completing HNC proceed to the B.Eng. During the ten years that students have progressed to B.Eng from HNC no student has failed to gain a B.Eng. No student has gained either a pass degree or a 3rd Class Honours degree. Two students have gained 1st Class Honours and the rest 2:1 or 2:2 Honours degrees with a ratio of 4:6. Sound relationships with industry have been developed over the years and a Deeside company is sponsoring a former HNC - mechanical student on a B.Eng on a part time basis and a Wrexham based company has elected to sponsor their employee on the full time B.Eng for two years. The HNC curricula in both the electrical and mechanical disciplines share areas of commonality and so joint delivery to both electrical and mechanical students will be undertaken where appropriate to facilitate efficient delivery. The first year of the programmes has the greatest degree of commonality with Mathematics, Engineering Design and Materials being typical examples of modules delivered jointly representing 75% of the first year delivery In the second year Business & Management Techniques is delivered jointly and mechanical and electrical projects are supervised by the programme leader representing 57% commonality. The HNC is seen by employers and their employees as being an established and trusted sub-degree vocational qualification which forms an integral part of the educational element of engineering apprenticeships. The curriculum embraces both analytical content and its application in an industrial setting. The latter manifests itself in the Project which is undertaken in the workplace during the second year of the programmes. Underpinning knowledge needed for the Project is provided in the first year by the Engineering Design module which provides the knowledge of design principles implemented in the course of the Project. Additionally, the Business & Management Techniques module is partially assessed by a topical assignment which relates to employment law. A typical recent example being an assignment on Ageism in the workplace.

As stated in the previous paragraph, the HNCs form an integral part of the majority of engineering apprenticeships. It is well established and its value is understood by all parties in the industry. Nearly all HNC students are sponsored by their employers and all of those students embarked upon an apprenticeship programme are sponsored. The attendance in a university setting of the HNC cohorts has had the effect of broadening horizons and consequently for a number of years progression to B.Eng has taken place. The module content matches substantially the Subject Benchmark statement for Engineering, further underpinning the opportunities for progression to honours degree status.

With regard to the Framework for Higher Educational Qualifications - FHEQ requirements; the HNC programmes meet the criteria for Certificate of Higher Education Certificate level 4 and the HND programmes meet the criteria for Higher Diplomas Intermediate level 5. www.qaa.uk./academicinfrastructure/fheq/ewni/default.asp refers.

The programme team draws upon the currency of knowledge gained from several team members who are external examiners and who operate in the field at sub-degree – aka HNC/HND/FD level and at first degree level.

Employers such as those referred to previously have been canvassed together with programme teams at the franchised centres with regard to changes required to make modules fresh and relevant in terms of their content. Dialogues were established with a number of

training and line managers which have informed changes to the curriculum for example in areas such as CAD/CAM and the use of rapid prototype technology.

Presently the HNC and HND programmes meet the criteria required by the Engineering Council within its UK Spec document to satisfy the *educational requirements for registration as Engineering Technician – Eng Tech, and* coupled with a NVQ at level 4 meet the requirements for registration as Incorporated Engineer – I.Eng with the Engineering Council. It should be noted that unlike degree programmes, HNCs and HNDs are not required to be accredited through accreditation events as is the case for centres seeking accreditation for degree programmes. Clarification on this point may be found at www.engc.org.uk on pdf document U.K. Standards for Professional Engineering Competences.

The aim of the HNC programmes is to provide a coherent package of analytical knowledge together with the facilitation of the application of that knowledge facilitated through lab based activities and work based projects in compliance with FHEQ requirements. The HND expands on the HNC package in terms of curricular level and breadth again in compliance with the FHEQ requirements.

There are two programmes to be considered when examining learning outcomes in this validation, the HNC and the HND. The differentiation between electrical and mechanical sub-sets within the programmes will be considered generically to minimise confusion.

a) HNC Knowledge & Understanding, b) Intellectual skills, c) Subject skills and d) Practical, professional and employability skills are summarised within the FHEQ guide to academic qualifications thus:*' The holder of a certificate of higher education will have a sound knowledge of the basic concepts of a subject, and will have learned how to take different approaches to solving problems. Their studies may well have had a vocational orientation, enabling them to perform effectively in their chosen field.'*

Similarly the four HND criteria are summarised within the FHEQ guide to academic qualifications thus: *'Holders of qualifications at this level will have developed a sound understanding of the principles in their field of study, and will have learned to apply those principles more widely. Through this, they will have learned to evaluate the appropriateness of different approaches to solving problems. Their studies may well have had a vocational orientation, enabling them to work effectively in their chosen field.'*

2.0a Business rationale

The sound relationship built up between programme teams and industry has led to increased awareness of the talent and skills base that Glyndŵr University has to offer industry. On average two or three students each are sent each year from Ball Packaging, Kronospan, DRB Engineering, Kellogg's, Portable Foods, The Cheese Company, PET, LME and a number of smaller SMEs. Ball Packaging for example manufactures beverage cans in Wrexham and is part of an American multi-national group. Ball wanted to know if we might improve the efficiency of die change-overs on production lines. Steve Byrne went into the company and observed both day and night shift operations. Steve produced a short course in SMED which enabled the die changing time to be dramatically reduced. This input has enabled annual production to rise from 1.8 billion units per annum to 2 billion. Additionally, Ball Packaging has sought other consultancy including linguistic expertise to support Polish based employees of Ball which in addition to the SMED has resulted in consultancy revenue.

2.0b Academic/Vocational Rationale

The programmes have been based on the current successful provision and in consultation with employers including DRB Engineering, Ball Packaging, Kellogg's, Portable Foods, Kronospan, and JCB. The programmes have been updated to ensure currency and to maximise efficiency in delivery across the range of programmes offered within Engineering at GU. The content of modules has been reviewed to reflect current industrial needs and practice.

2.1 Staff Profiles

Staff	Expertise & Research Interests	Modules
Graham Smith. Programme Leader. Franchise Coordinator S.L	Telecommunications, radar, navigational aids, electrical engineering, management, logistics. M.Phil published in 2007 considered the role and value of HNC and HND qualifications in U.K. and abroad. It was regarded by Professor Alan Smithers as a significant piece of research in an under researched area. Accepted by CILT as a Member at the beginning of June 2010. Registered at The University of Limerick on a Ph.D which considers the development of technician education in Ireland since 1970.	Business & Management Electrical Science Project Electrical & Electronic Principles Engineering Design Thermodynamics Electronics
Steve Byrne. S.L.	Developed Rapid Prototype technology and incorporated it into this submission. Expertise in manufacturing, design, CA|D, CAM, Quality Assurance and plant management/design. Conducted third mission activities in companies such as Ball Packaging where a bespoke course in SMED was delivered which resulted in production increase from 1.8 billion to 2 billion units per annum. Recently awarded Grade 'A' for Knowledge Transfer Programme delivered at Welsh Lady Preserves at Pwlleli. Highest grade in U.K. this year.	Mechanical Science Mechanical Principles Engineering Computer Applications Engineering Materials CAD/CAM Quality Assurance & Management Design for Manufacture
Frank Welcomme. P.L	Conducting developmental work in industrial data networks and energy storage systems for sustainable energy generation systems.	Mathematics Measurement & Testing Programmable Logic Controllers Instrumentation & Control Principles Microprocessor Systems Further Maths Group Project
Dr. Yuriy Vagapov S.L.	Research areas include Power Electronics, Drives, Machines and Automotive Electronics. Publications include: Chakirov, R., Vagapov, Y. (2010). Rapid control prototyping platform for the design of control systems for automotive electromechanical actuators	Power Electronics Generation & Distribution Utilisation of Electricity Electrical Power Combinational & Sequential Logic Further Electrical Power

	Chakirov, R., Vagapov, Y., (2010). Active sidestick for fly by wire systems. Journal of Electrical & Electronic Engineering. 2 (4) Chakirov, R., Vagapov, Y., & Gaede, A. (2007) Sensorless detection of rotor position of PMBL motor at stand still. Proceedings of the World Coingress on Engineering & Computer Science, San Fransisco (USA) 24-26 October 2007, pp 411-415	
Dr. Richard Grant. P.L.	Research bids – TCS MicroMateraials DTI funded £100,000 2003-2005 FTP SPi Play Wrexham DTI funded £100,000 2005-2007. Ankle Joint Simulator, Institute of Orthopaedics. £20,000 2009-12 With Szkatiua L & Zouaoui Z Computational analysis of wake vortices generated by notched wings, A/AA Journal of Aircraft, A/AA 2007 With Elsari M & Cummings A, Experimental investigation of the bulk acoustic properties of sound absorbing material. World Journal of Engineering, 4(3), 2007 pp 73-86	Advanced CAD Computer Aided Machining Robot Technology
Eur Ing Joe Tatler	Published on DC to DC conversion techniques, and numerical modelling of oxide film defects in aluminium castings Fellow of the IMechE	Engineering Mathematics Further Mathematics

2.2 Module List

(Individual programme structures can be found in section 2.3)

Module Code	Module Title	HNC E	HND E	HNC M	HND M	Core/ Optional	Level	Credits
	Business & Management Techniques	/	/	/	/	C	4	20
	Engineering Mathematics	/	/	/	/	C	4	20
	Mechanical Science			/	/	C	4	20
	Electrical Engineering Science	/	/			C	4	20
	Project	/	/	/	/	C	5	20
	Mechanical Principles			/	/	C	5	10
	Electrical & Electronic Principles	/	/			C	5	10
	Engineering Computer Apps			/	/	O	4	20
	Engineering Design	/ C	/ C	/ O	/ O	C/O	4	10
	Engineering Materials	/ C	/ C	/ O	/ O	C/O	4	10
	Manufacturing Technology			/	/	O	4	20
	CAD/CAM			/	/	O	4	20
	Measurement & Testing		/		/	C	5	10
	Quality Assurance & Management		/		/	C	5	20
	Thermo-Fluid Mechanics				/	O	5	20
	Programmable Logic Controllers	/	/			C	4	20
	Instrument & Control Principles	/	/			O	4	20
	Power Electronics		/			O	5	20
	Generation & Distribution		/			O	5	20
	Utilisation of Electricity		/			O	5	20
	Electrical Power	/	/			O	4	20
	Design for Manufacture		/		/	O	5	20
	Electronics	/	/			O	4	20
	Combinational & Sequential Logic		/			O	5	20
	Advanced CAD				/	O	5	20
	Computer Aided Machining				/	O	5	20
	Robot Technology				/	O	5	20
	Further Electrical Power		/			O	5	20
	Microprocessor Systems		/			O	5	20
	Further Mathematics		/		/	O	5	20
	Group Project		/		/	C	5	20

2.3 Programme Learning Outcomes

The programme learning outcomes (PLOs) are shown in tabular format overleaf. It should be noted that whilst the HNC programme is predominantly NQF level 4, the project together with electrical and/or mechanical principles 10 credit points are at level 5 thus providing 120 credit points at NQF level 4 and 30 at NQF level 5.

The PLOs for the Electrical and Mechanical courses are substantially generic. This is clearly the case with areas B, C and D; for area, Knowledge and Understanding, the distinction between Electrical and Mechanical is further distinguished as is shown below.

2.3.1 Programme Learning Outcomes.

A. Knowledge & understanding

	HNC	HND
Knowledge – A1 (descriptions of facts; criteria; definitions; classifications; data organisations; principles; theories)	Demonstrates familiarity with the basic facts and principles of: a) Electrical & Electronic Engineering, b) Mechanical Engineering. Demonstrates safe practice in workshop and laboratory environments	a) Applies electrical and electronic theory to devices and systems. b) Applies mechanical theory to devices and systems.
Understanding – A2 (interpretation and demonstration of understanding of knowledge in the various categories listed above	Demonstrates a working understanding of the principles and practices of: a) Electrical & Electronic and Electronic Engineering, b) Mechanical Engineering. Demonstrates competence in workshop and practice and laboratory investigations.	Demonstrate a sound understanding of the role of an engineer as a manager of him/her self and of others, ensuring the highest level of ethical and professional conduct and acting within the legal framework governing engineering activities.

B. Intellectual skills

	HNC	HND
Application – B1 (use of knowledge and comprehension in problem solving)	Undertakes routine applications of basic engineering principles and practices with guidance provided by academic staff	Pedagogical progression from knowledge and experience gained at level 4 and applies same to more challenging engineering problems with a greater degree of autonomy and with less guidance from staff.
Analysis – B2 (reducing complex engineering problems to their fundamental parts based on an understanding of the principles involved)	Tackles routine engineering problems by means of mathematical analysis of the principles and through lab' investigation and workshop activity such as reverse engineering.	Pedagogical progression from experience gained at level 4 tackling multi faceted problems using software packages in the analysis of applied complex engineering principles with a greater degree of autonomy than before.
Synthesis – B3 (combining elements to form coherent systems)	Relates a number of facts, ideas and elements to form a coherent approach to engineering design problems.	Pedagogical progression from experiences gained at level 4 by employing lateral thinking in the design process making arguments for alternative design ideas for a given scenario.
Evaluation – B4 (forming value judgements based on clear criteria)	Forms value judgements based on sound engineering principles when addressing engineering and engineering related challenges.	Makes independent judgements informed by own criteria occasionally referring to staff.

C. Subject specific skills

	HNC	HND
Students will develop technical skills involving engagement in	The student will adopt an informed approach to industrially based	As the HND cohorts are work based and part time, the

practical and project work. The practical work in labs' and workshops underpins and supplements theoretical work. The project is work based at level 4 and at level 5.	engineering problems in his or her branch of engineering. The work based project will consider several potential challenges and cost benefit analysis will be employed to determine the most appropriate project to be undertaken	knowledge base is widened at this level and the work based projects are frequently an expansion of project work done at level 4 involving increased complexity and rigour.

D. Practical, Professional and Employability skills

	HNC	HND
Communications and Presentation Skills – D1	Communicates clearly and concisely both orally and in writing adopting academic and technical protocols in report writing ensuring that sentences possess both subject and predicate.	Further develops communications skills through expansion of technical and social vocabulary, correct syntax and punctuation
Numeracy – D2	Applies arithmetic and algebraic concepts to the solution of engineering problems. Develops the use of complex numbers.	Applies algebraic, arithmetic, trigonometrical techniques and the calculus to the solution of engineering problems
IT Skills – D3	Demonstrates computer literacy in report writing using Word and Excel packages	Uses software packages in the analysis of complex engineering problems. Demonstrates competence in use of relevant software packages.
Learning Skills – D4	Demonstrates an ability to engage in some self directed learning and to work to schedules.	Demonstrates a significant degree of autonomy in the approach to managing the learning process
Interactive and Group Skills – D5	Exhibits the social skills required in both a work and learning environment	Exhibits confidence in a number of unfamiliar social situations.
Problem solving – D6	Applies knowledge of engineering principles to the solution of engineering problems	Applies accumulated knowledge to the solution of complex engineering problems

2.4 CURRICULA MATRICIES

Separate matrices are provided for HND electrical and mechanical programmes, HNC mechanical and the three HNC electrical pathways.

HNC Mechanical Technology															
Level	Module Title	Core/ option	A1	A2	B1	B2	B3	B4	C	D1	D2	D3	D4	D5	D6
4	Business & Management Techniques	C 20							*	*			*	*	
4	Engineering Mathematics	C 20	*	*		*			*		*	*			
4	Mechanical Science	C 20	*	*		*		*			*		*		*
5	Project	C 20	*	*	*	*	*	*		*	*	*		*	*
5	Mechanical Principles	C 10	*	*		*		*			*		*		*
4	Engineering Computer Applications	O 20	*	*	*	*					*	*	*		
4	Engineering Design	O 10	*	*	*	*	*	*	*	*		*			*
4	Engineering Materials	O 10	*	*		*			*	*					*
4	CAD/CAM	O 20	*	*	*	*					*	*	*		
4	Manufacturing Technology	O 20	*	*	*				*	*			*		

Students will complete 60 Level Four and 30 Level Five **core** credits, and take 60 Level Four **optional** credits.

HNC Electrical Technology															
Level	Module Title	Core/ option	A1	A2	B1	B2	B3	B4	C	D1	D2	D3	D4	D5	D6
4	Business & Management Techniques	C 20							*	*					
4	Engineering Mathematics	C 20	*	*		*			*		*	*			
4	Electrical Engineering Science	C 20	*	*		*		*			*		*	*	*
4	Programmable Logic Controllers	C 20	*	*	*				*	*		*			*
4	Engineering Design	C 10	*	*	*	*	*	*	*	*		*			*
4	Engineering Materials	C 10	*	*		*			*	*					*
4	Instrumentation & Control Principles **(I)**	O 20	*	*	*	*			*		*	*			*
4	Electrical Power **(P)**	O 20	*	*	*	*			*		*	*			*
4	Electronics **(E)**	O 20	*	*	*	*			*		*	*			*
5	Project	C 20	*	*	*	*	*	*		*	*	*		*	*
5	Electrical & Electronic Principles	C 10	*	*		*		*			*		*		*

The HNC above comprise 130 core modules. There is then a choice of one of three 20 credit pathway modules, either (I), (P) or (E). The pathway will be chosen or identified in response to local industrial demand depending on the site of delivery.

HND Electrical Technology															
Level	Module Title	Core/option	A1	A2	B1	B2	B3	B4	C	D1	D2	D3	D4	D5	D6
4	Business & Management Techniques	C 20								*					
4	Engineering Mathematics	C 20	*	*		*			*		*	*			
4	Electrical Engineering Science	C 20	*	*		*		*			*		*	*	*
4	Programmable Logic Controllers	C 20	*	*	*				*	*		*			*
4	Engineering Design	C 10	*	*	*	*	*	*	*	*		*			*
4	Engineering Materials	C 10	*	*		*			*	*					*
5	Project	C 20	*	*	*	*	*	*		*	*	*		*	*
5	Electrical & Electronic Principles	C 10	*	*		*		*			*		*		*
5	Measurement & Testing	C 10	*	*	*	*	*	*	*	*	*	*	*	*	*
5	Group Project	C 20	*	*	*	*	*	*	*	*	*	*	*	*	*
5	Quality Assurance & Management	C 20	*	*	*	*	*	*		*		*		*	*
4	Instrumentation & Control	O 20	*	*	*	*			*		*	*			*
4	Electrical Power	O 20	*	*	*	*			*		*	*			*
4	Electronics	O 20	*	*	*	*			*		*	*			*
5	Power Electronics	O 20	*	*	*	*			*	*	*	*			*
5	Generation & Distribution	O 20	*	*	*	*			*	*	*	*			*
5	Utilisation of Electricity	O 20	*	*	*	*		*	*	*	*	*			*
5	Design for Manufacture	O 20	*	*	*	*	*	*	*			*			*
5	Combinational & Sequential Logic	O 20	*	*	*	*			*	*	*		*		*
5	Further Electrical Power	O 20	*	*	*	*			*		*	*			*
5	Microprocessor Systems	O 20	*	*		*	*		*	*	*	*			*
5	Further Mathematics	O 20	*	*		*			*		*	*			

To be awarded HND Electrical & Electronic Technology, students will be required to complete 100 Level Four and 80 Level Five **core** credits, and take 20 Level Four and 40 Level Five **optional** credits.

The HND conversion course offered at Coleg Menai builds on the HNC programme, and comprises an additional 90 Level 5 modules which include as core Measurement & Testing (10), Quality Assurance Management (20), Group Project (20) plus two other 20 credit modules from the options shown.

HND Mechanical Technology															
Level	Module Title	Core/option	A1	A2	B1	B2	B3	B4	C	D1	D2	D3	D4	D5	D6
4	Business & Management Techniques	C 20								*			*	*	
4	Engineering Mathematics	C 20	*	*		*			*		*	*			
4	Mechanical Science	C 20	*	*				*			*		*		*
5	Project	C 20	*	*	*	*	*	*		*	*	*	*		*
5	Mechanical Principles	C 10	*	*		*		*			*		*		*
5	Measurement & Testing	C 10	*	*	*	*			*		*	*	*		
5	Quality Assurance & Management	C 20	*	*	*		*		*	*			*		*
5	Group Project	C 20	*	*	*	*	*	*		*	*	*	*	*	*
4	Engineering Design	O 10	*	*	*	*	*	*	*	*		*			*
4	Engineering Materials	O 10	*	*		*			*	*					*
4	Engineering Computer Applications	O 20	*	*	*	*					*	*	*		
4	CAD/CAM	O 20	*	*	*	*					*	*	*		
4	Manufacturing Technology	O 20	*	*	*				*	*			*		
5	Advanced CAD	O 20	*	*	*	*					*	*	*		
5	Computer Aided Machining	O 20	*	*	*	*					*	*	*		
5	Robot Technology	O 20	*	*	*	*					*	*	*		
5	Thermo-Fluid Mechanics	O 20	*	*		*		*	*	*	*	*			*
5	Design for Manufacture	O 20	*	*	*	*	*	*	*			*			*
5	Further Mathematics	O 20	*	*		*			*		*	*			

To be awarded HND Mechanical Technology, students will be required to complete 60 Level Four and 80 Level Five **core** credits, and take 60 Level Four and 40 Level Five **optional** credits.

The HND conversion course offered at Coleg Menai builds on the HNC programme and comprises 90 Level 5 modules which include as core Measurement & Testing (10), Quality Assurance Management (20), Group Project (20) plus two other 20 credit modules from the options shown.

3. PROGRAMME STRUCTURE

The HNC programmes are of two years duration being delivered on a part time day release basis one day per week commencing at 0900 and terminating at 1800. There is one intake per year in September. First year and returning second year students enrol in September. Students who for whatever reason fail to complete the HNC programme successfully will be awarded a transcript of results which gives recognition to the numbers of modules achieved.

The HND top-up programmes are of one year duration being delivered on the same part time day release basis as the HNC. Under the present structure the 150 credit points of the HNC are 'topped up' by 90 credit points to provide 240 credit points with the correct proportion of level 4 and level 5 modules. Those students who for whatever reason fail to achieve 90 credit points will be awarded a transcript of results reflective of the modules/credit points that they have achieved.

The purpose of the options is to provide the opportunity for those students who have achieved their HNC qualification at different sites and following different pathways, (I), (E) or (P), is identified earlier in this document to progress to the HND conversion which will be offered at Coleg Menai.

Indicative delivery schedules for Glyndŵr University
(Note: schedules have not been included for either of the HND programmes as these are not normally offered at the University)

HNC Mechanical Technology Year One

Time	Unit	Credit	Staff
9.00 - 11.00	Mechanical Science	C 20	Steve Byrne
11.00 – 13.00	Engineering Mathematics	C 20	Joe Tatler
14.00 – 15.00	Engineering Design	O 10	Steve Byrne
15.00 – 16.00	Engineering Materials	O 10	Richard Grant
16.00 – 18.00	Engineering Computer Applications	O 20	

HNC Mechanical Technology Year 2

Time	Unit	Credit	Staff
9.00 - 11.00	Business Management Techniques	C 20	Graham Smith
11.00 – 12.00	Mechanical Principles	C 10	Steve Byrne
13.00 – 15.00	Optional module	O 20	
15.00 – 17.00	Project	C 20	Graham Smith
17.00 – 18.00	Tutorials*		Graham Smith

*Whilst there has been a nominal allocation for tutorials, it is anticipated that tutorial support would be given throughout both years of the programme delivery.

HNC Electrical and Electronic Technology Year 1

Time	Unit	Credit	Staff
9.00 - 11.00	Electrical Engineering Science	C 20	Graham Smith
11.00 – 13.00	Engineering Mathematics	C 20	Joe Tatler
14.00 – 15.00	Engineering Design	C 10	Steve Byrne
15.00 – 16.00	Engineering Materials	C 10	Steve Byrne
16.00 – 18.00	Instrumentation & Control Principles	O 20	Frank Welcomme

HNC Electrical and Electronic Technology Year 2

Time	Unit	Credit	Staff
9.00 - 11.00	Business Management Techniques	C 20	Graham Smith
11.00 – 12.00	Electrical and Electronic Principles	C 10	Graham Smith
13.00– 15.00	Programmable Logic Controllers	C 20	Frank Welcomme
15.00 – 17.00	Project	C 20	Graham Smith
17.00 – 18.00	Tutorials*		Graham Smith

*Whilst there has been a nominal allocation for tutorials, it is anticipated that tutorial support would be given throughout both years of the programme delivery.

4. ADMISSIONS

Admission on to the HNC programme is conditional upon potential students having gained a suitable pre-requisite qualification that has covered mathematics and a science subject to NQF level 3. Thus students with appropriate GCE A – levels, Edexcel/BTEC National Certificate or National Diploma which includes the mathematics module in a suitable engineering discipline, or a certificate to indicate satisfactory completion of an appropriate Access course will meet the admissions criteria.

Admission to the HND is conditional upon successful completion of a Glyndŵr HNC or an HNC obtained elsewhere that addresses the same learning outcomes of the GU HNC in a given discipline be it electrical or mechanical. APL of the 150 credit points of current HNCs is formally undertaken prior to enrolment on to the HND.

5. LEARNING AND TEACHING

Outcomes are achieved through the adoption of diverse pedagogical strategies which include workshop/lab activities, formal and informal lectures and tutorials, self directed learning through investigative assignment work.

A feature of the programme that exemplifies the links between the university, the student and industry is the work based project. This approach to the project has been flagged by the External Examiner, Dr. Edmondson reports as being an example of excellent practice. The use of cost benefit analysis to determine which of several proposed projects would benefit the employer most has been highlighted by the External Examiner as being of real value to both

the employer and the student. Regular meetings take place with students throughout the first and second semester of year two which enable progress and way-points identified on Gantt charts to be observed. This practice enables slippage or increased progress to be identified. Recognition of changes in employee work schedules due to organisational requirements is also taken into account. The final project is inspected in situ after commissioning. Dr. Edmondson is acknowledged as being an expert in the field of work based learning.

The programme team continues to employ strategies to facilitate students with disabilities in compliance with the tenets of Section 1.1 of the university's Disability Equality Scheme 2006 – 2009. With regard to Welsh Medium provision; at Coleg Menai both the HNC and HND provision are routinely delivered in both Welsh and English reflecting the common usage of Welsh in day to day life in Northwest Wales.

With regard to work-based learning; both HNC and HND students are in employment and so issues associated with placements do not arise.

The team are currently exploring the use of the Moodle VLE at Glyndŵr University. The site is currently at the development stage at the University although it is established at the Coleg Menai and Deeside campuses. Each site will therefore be using the same VLE system and this will facilitate the creation of common areas of communication as the Glyndŵr site develops.

6. ASSESSMENT

A range of assessment strategies are employed within the programmes and the frequency of assessment opportunities has been reduced by the expedient of assessing several learning outcomes within a single assessment opportunity. The Projects are all work based and their relevance is determined by the employer and project supervisor. During the course of the Project over the two semesters of year two progress reports are taken from students and progress is determined by the use of Gantt charts which are used as benchmarks against real time progress. Thus slippage or time gained may be identified. The completed project is inspected in situ on site by the academic who is the project supervisor. Analytical subjects such as Electrical and Mechanical Principles employ a combination lab work, self directed assignment and time constrained assessment with assessment opportunities in each module being limited to two. Business & Management Techniques employs a research based assignment often associated with work related legislation and a time constrained assessment.

Assessment schedule

Module Title	Core/ Option	Report	Time constrained assessment	Report with electronic submission	Practical
Business & Management Techniques	C 20	50% 3000 words	50% 2 hrs		
Engineering Mathematics	C 20		50% 1 hr 30% 1 hr		20%
Mechanical Science	C 20		2 @ 40%, 90 mins each		20%
Electrical Engineering Science	C 20		50% 2 hrs		50%
Project	C 20	100% 4000			
Mechanical Principles	C 10		70% 90 mins		30%
Electrical & Electronic Principles	C 10		60% 2 hrs		40%
Engineering Computer Apps	O 20			30% 500, 70% 2000	
Engineering Design	C/O 10	100% 3000			
Engineering Materials	C/O 10	50% 2000	50% 1 hr		
Manufacturing Technology	O 20	30% 1200, 30% 1200, 40% 1500			
CAD/CAM	O 20				30%, 30%, 40%
Measurement & Testing	C 10				2 @ 50%
Quality Assurance & Management	C 20	34%, 33%, 33%, all @ 1500			
Thermo-Fluid Mechanics	O 20	30% 2000	70% 90 mins		
Programmable Logic Controllers	C 20	40% 2000			60%
Instrument & Control Principles	O 20	40% 1500			30%, 30%
Power Electronics	O 20	70% 2000			30%
Generation & Distribution	O 20	2@ 50%, all @ 2000			
Utilisation of Electricity	O 20	30% 1000	40% 1 hr		30%
Electrical Power	O 20		50% 2 hrs		50%
Design for Manufacture	O 20	100% 3000			
Electronics	O 20		50% 1 hr		50%
Combinational & Sequential Logic	O 20	50% 2000	50% 2 hrs		
Advanced CAD	O 20			30%, 35%, 35% all @ 600	
Computer Aided Machining	O 20		30% 1 hr	2 @ 35% @ 600	
Robot Technology	O 20	30% 600			2@35%
Further Electrical Power	O 20		70% 2 hrs		30%
Microprocessor Systems	O 20	40% 600			60%
Further Mathematics	O 20		2@50% all at 90 mins		
Group Project	C 20	2@ 50% @2000			

7. LEARNING INFRASTRUCTURE AND STUDENT SUPPORT

The use of mathematics as a tool with which to address analytical engineering problems has presented engineering students with challenges due often to a tenuous grasp of basic mathematical concepts and principles. This problem is largely due to the abstract context in which the principles are taught in the first instance. Experience shows that if the mathematical concepts are contextualised they are more readily understood. So for example in the context of Electrical Science complex numbers may be applied to real and reactive components. Similarly simple two component passive circuits can be and are used to demonstrate the concepts of integration and differentiation. Additionally, specialised extra maths tutors are available to input to the mathematical development of the students. All students benefit from an induction process which introduces them to library and I.T. facilities. The information provided at induction is also laid out in the student handbook which is provided at the commencement of year one. At Glyndŵr the Programme Leader is responsible for the management of the programmes also has the role of Personal Tutor thus providing a continuum throughout the duration of the course for the student and a common point of reference for employers. A similar set-up applies at the franchised centres. Additionally, informal arrangements via an open door policy are implemented for tutorial advice.

A range of software packages are available on the library and workshop networked PCs including specialist CAD packages and CAM equipment. Both electrical and mechanical labs are suitably equipped to meet the needs of the programmes at Glyndŵr and at the franchised centres. The External Examiners' reports refer favourably to the facilities at the sites.

Research active staff and those engaged in third mission activities contribute to the programme team including a colleague whose Knowledge Transfer Programme was recently completed and rated Grade 'A', the highest rating in Wales. The staff profiles provided on pages 5 and 6 reflect the expertise and experience that they and similarly engaged team members bring to the students.

8. PROGRAMME MANAGEMENT ARRANGEMENTS

Internal verification is embedded at all three sites and is seen as an integral part of the assessment processes. Staff Student Consultative Committees – SSCCs are set up to record feedback formally and minutes of these meetings are discussed at School Boards with appropriate action being taken as necessary. Additionally, course team members receive informal feedback from students which is fed back to the course tutor.

As indicated previously the management of the Glyndŵr provision and of the franchise arrangements together with personal and course tutorships and admissions rests with the programme leader.

Presently there are no inputs from other schools into the programmes at Glyndŵr and at the franchised centres.