PROGRAMME SPECIFICATON

1	**Awarding body**	Glyndŵr University
2	**Teaching institution**	Glyndŵr University
3	**Award title**	
	MSc Robotics	
4	**Final awards available**	
	MSc Robotics, PGDip Robotics, PGCert Robotics	
5	**Professional, Statutory or Regulatory Body (PSRB) accreditation**	
	N/A	
	Please list any PSRBs associated with the proposal	
	N/A	
	Accreditation available	
	N/A	
	Please add details of any conditions that may affect accreditation (eg is it dependent on choices made by a student?)	
	N/A	
6	JACS3 **code**	I100
7	UCAS **code**	N/A
8	**Relevant QAA subject benchmark statement/s**	
	Robotics cuts across a number of different disciplines in particular: Computing, Engineering and Psychology. Even though there are elements of cross disciplinary work this programme is concentrating on the Computing and Artificial Intelligence aspects of the subject. It can be seen that this programme fits into the Quality Assurance Agency for Higher Education 2011 (ISBN 978 1 84979 284 4) definition of Computing: "Computing is the discipline associated with the structuring and organisation of information as well as the automatic processing and communication of that information. The application of ideas from computing underpins innovation across a wide range of activity, including engineering, business, education, science and entertainment". Additionally it defines taught Masters programmes as: "The range of possible master's degree programmes in computing includes: degree programmes which build very directly on undergraduate honours degrees in some aspect of computing and provide a focus on some particular technology or aspect of computing in greater depth, e.g. as preparation for research".	
9	**Other external and internal reference points used to inform the programme outcomes**	
	Investigations into Masters Robotics programmes provided by other Universities with a similar standing to Glyndŵr University	
10	**Mode of study**	Full & part time
11	**Language of study**	English

Office use only

31 May 2016

12 Criteria for admission to the programme

Standard entry criteria	
UK entry qualification	Applicants for postgraduate degrees require a minimum of 2:2 class undergraduate degree

International entry qualification

- *Qualifications outlined on the National Academic Recognition and Information Centre (NARIC) as equivalent to the above UK entry qualification.*

Programme specific requirements	The standard entry requirement for the MSc programme is an honours degree of at least 2:2 classification in a Computer Science related subject area, or equivalent in a science-based degree with a strong computing and/or engineering element.
Non-standard entry criteria (e.g. industry experience)	In some cases a non-graduate candidate may be accepted provided that the applicant has substantial commercial or industrial experience or held a responsible position which is relevant to the programme to be pursued for a minimum of two years, within the previous five years. This is subject to interview and references.

In addition to the academic entry requirements, overseas students require a UKVI Approved Secure English Language Test (SELT) achieving an overall score of 6.5 with no component below 6.0. If arranging a test, applicants must ensure they book an 'IELTS for UKVI' test. For further information see: http://takeielts.britishcouncil.org/ielts-ukvi/book-ielts-ukvi
Applicants are asked to note that only an IELTS for UKVI test result will be accepted.

13 Recognition of Prior (Experiential) Learning

Programme specific requirements	In some cases it may be appropriate to provide students with an exemption from studying certain modules. This will be done in line with the Glyndŵr University RP(E)L procedures.

14 Aims of the programme

MSc Robotics is intended to be both an academic and industry facing programme. It is aimed at graduates from a computing / engineering / science discipline who wish to focus their skills and competencies in understanding the practical and theoretical aspects of robotic systems. This is an area with a wide-range of applications in industry and research.

Modules studied on the programme have been designed to provide the skills to meet industrial and commercial needs as well as those of traditional academic standing. In addition to the academic and theoretical aspects the emphasis will be on the practical

side of robotics to enable graduates to practise as a professional in industry or continue with further study towards a research degree. To complete the roundedness of the programme aspects of the future of robotics are identified and an attempt is made to provide solutions to these issues with particular emphasis on the effect on society.

The programme aims to provide the students with the following:

- specialist, advanced technical skills in the area of Robotics
- an advanced understanding and competence in the hardware and software used for the development and use of Robotics
- hands-on experience of state of the art equipment
- the ability to critically appraise and disseminate research results
- a sound basis for further research and / or professional development.

15 Distinctive features of the programme

This MSc focuses on the computational side of Robotics with an emphasis on the software engineering aspects. In addition it provides the ability to investigate the field of Artificial Intelligence applicable to this sector and a substantial portion of the programme concentrates on the effect that robots have on society. It is the intention of this programme to produce specialists with up to date knowledge and skills that are capable of being used in an industrial, commercial and research environment.

Although the necessary background is introduced as appropriate, the course deals with problem-solving and the provisioning of real time aspects of computer based solutions and applications using current and emerging technologies. In addition to developing an understanding of underlying principles, students are engaged in the practical application of design, implementation, trouble-shooting and management for real-world problems.

16 Programme structure narrative

The MSc Robotics is offered in full-time and part-time mode. As with most masters programmes the MSc Robotics has 2 parts, a taught part and then the dissertation. Students study 120 credits taught modules made up of 6 20 credit modules followed by a 60 credit dissertation making a total of 180 credits. The structure and the modules can be seen in the diagram.

Part One	**All Core:** Post Graduate Study and Research Methods Future & Emerging Technologies Advanced Artificial Intelligence Robotic Software Engineering Robotic Applications in Society Computational Robotics
	↓
Part Two	Dissertation

There are 4 modules (including the Dissertation) that are shared modules between this programme and the University's other Computing programmes, which makes the delivery more efficient.

An exit award from MSc Robotics is PGC Robotics and is available to students who successfully complete 60 credits, but who find they are unable or choose not to continue with the programme. The PGD exit award is PGD Robotics and this is available to students who successfully complete 120 credits of Part One, and they are unable or choose not to continue with the programme.

17 Programme structure diagram

Proposed Full Time Structure

Trimester 1	Mod title	Post Graduate Study and Research Methods	Mod title	Advanced Artificial Intelligence	Mod title	Robotic Software Engineering
	Mod code	COMM50	Mod code	COM722	Mod code	COM727
	New/Exist	Existing	New/Exist	Existing	New/Exist	New
	Credit value	20	Credit value	20	Credit value	20
	Core/Opt	Core	Core/Opt	Core	Core/Opt	Core
	Mod leader	Dr. S Cunningham	Mod leader	Dr Bo Liu	Mod leader	Dr N Houlden
Trimester 2	Mod title	Future & Emerging Technologies	Mod title	Robotic Applications in Society	Mod title	Computational Robotics
	Mod code	COMM51	Mod code	COM726	Mod code	COM725
	New/Exist	Existing	New/Exist	New	New/Exist	New
	Credit value	20	Credit value	20	Credit value	20
	Core/Opt	Core	Core/Opt	Core	Core/Opt	Core
	Mod leader	Prof. V Grout	Mod leader	Denise Oram	Mod leader	Dr J. N. Davies

Trimester 3	Mod title	Dissertation
	Mod code	COMM56
	New/Exist	Existing
	Credit value	60
	Core/Opt	Core
	Mod leader	Prof. R Picking

Part Time
In part time mode there are a number of categories depending on the requirements of the students. UK based students will normally be employed and so have a delivery designed specifically for them but will fit in with the classes delivered for the full time students. However the duration of their study will be extended and will not be less than 2 years. Typically these students would study 2 x 20 credit modules per year, taking 3 years plus 1 extra year to complete the Dissertation.

International students can be accommodated on this programme by studying in block mode. Students will attend summer schools (blocks) at Wrexham. A typical summer school will be run for a 6 week period during June and July each year. During this intense study period, typically 3 modules will be studied using lectures, tutorials and practical sessions. Students will complete some of the module assessments during the summer school and others in the weeks following being supported by remote access e.g. Skype, Moodle. These 3 modules will be completed by September. Following the completion of the first 3 modules at Summer School 1 students will be able to prepare for Summer School 2.

By attending 2 summer schools 6 modules will be completed and the student will then be in a position to start their dissertation. Students will normally submit their dissertation the following April/May time. The dissertation will be supported by the supervisor allocated following the submission of their proposal. Students are required to submit work regularly via Moodle which is used as the basis for remote meetings with the students via Skype. This allows one to one support for the dissertation process. Since the present students come from a specific university then the dissertation presentation is carried out by supervisors visiting their home university. If the students were not from a single location then it may be necessary for students to come to Glyndwr University to do this presentation.

For International students who need to recover work or undertake their dissertation away from Wrexham, assessments would be set based around robot simulators. These simulators are freely available throughout the world via the Open Systems structure and are identical to those used at Wrexham.

Typical Summer School delivery starts in June at the Wrexham Campus.

Depending on numbers of students it may be that Summer school 1 and Summer School 2 may take place in the reverse order.

Summer School 1	Mod title	Post Graduate Study and Research Methods	Mod title	Advanced Artificial Intelligence	Mod title	Robotic Software Engineering
	Mod code	COMM50	Mod code	COM722	Mod code	COM727
	New/Exist	Existing	New/Exist	Existing	New/Exist	New
	Credit value	20	Credit value	20	Credit value	20
	Core/Opt	Core	Core/Opt	Core	Core/Opt	Core
	Mod leader	Dr. S Cunningham	Mod leader	Dr Bo Liu	Mod leader	Dr N Houlden
Summer School 2	Mod title	Future & Emerging Technologies	Mod title	Robotic Applications in Society	Mod title	Computational Robotics
	Mod code	COMM51	Mod code	COM726	Mod code	COM725
	New/Exist	Existing	New/Exist	New	New/Exist	New
	Credit value	20	Credit value	20	Credit value	20
	Core/Opt	Core	Core/Opt	Core	Core/Opt	Core
	Mod leader	Prof. V Grout	Mod leader	Denise Oram	Mod leader	Dr J. N. Davies
Trimester 3	Mod title	Dissertation				
	Mod code	COMM56				
	New/Exist	Existing				
	Credit value	60				
	Core/Opt	Core				
	Mod leader	Prof. R Picking				

18 Intended learning outcomes of the programme

	Knowledge and understanding
	PG Certificate Robotics
A1	Demonstrate comprehensive, detailed, state-of-the-art knowledge of the specialist area of robotics covered by the programme within the context of the broader discipline of Computer Science.
A2	Make professional judgements in the selection of technologies for complex and dynamic scenarios
	PG Diploma Robotics
A3	Where appropriate, distinguish between or combine the principles of design and implementation in the production of solutions in the field of robotics
A4	Give an account of current and emerging developments in robotics
A5	Evaluate and progress their own performance on both a technological level and with consideration to professional codes of practice and ethics.
	MSc Robotics
A6	Utilise information resources and demonstrate how to access these to obtain state-of-the-art knowledge of current robotic systems
A7	Demonstrate a sufficiently detailed knowledge of research methods appropriate specifically to their 'Masters' advanced independent-study dissertation/project, together with detailed knowledge of the particular area in which the project is carried out

	Intellectual skills
	PG Certificate Robotics
B1	Work autonomously or with minimal guidance where appropriate, carry out confident and accurate selection and application of principles and procedures appropriate to the resolution of a range of situations and professional problems associated within the specialist area of robotics.
B2	Work autonomously or with minimal guidance where appropriate, identify and classify principles and ideas in contemporary information sources and situations to professional standards; analyse rigorously, effectively, critically and creatively; cope with complexity.
	PG Diploma Robotics
B3	Work autonomously or with minimal guidance where appropriate, bring together facts/ideas/elements in support of an argument or case presented to professional standards; confidently evolve alternative solutions and concepts
B4	Work autonomously or with minimal guidance where appropriate, confidently integrate theory with professional/vocational practice; evaluate theories, processes, solutions and outcomes critically and effectively; use the evaluations of others critically, reflectively and constructively
B5	Work autonomously or with minimal guidance where appropriate, identify, define and resolve a range of problems associated with the specialist area(s) covered by the programme, work to professional standards
	MSc Robotics
B6	Demonstrate mastery of the principles, techniques and procedures associated with the advanced independent-study project carried out during the 'Masters' stage, including the ability to work effectively from information provided , with little or no guidance.

	Intellectual skills
B7	Demonstrate mastery of the analytical skills associated with the 'Masters' stage project, again working autonomously or with minimal guidance where appropriate.
B8	Demonstrate the full range of skills needed to plan and manage a 'Masters'-level project and produce a report/dissertation/thesis or other suitable research output on same working to a detailed specification and to professional standards.
B9	Demonstrate the full range of evaluative skills associated with the 'Masters' stage project, including the effective exercise of judgement based on incomplete and/or contradictory information.
B10	Demonstrate professional competence in participating in the identification of a suitable 'Masters' project task and seeking a satisfactory solution that meets the specific requirements of the problem.

	Subject skills
	PG Certificate Robotics
C1	Make effective use of a range of theories and techniques applicable to a Robotics environments
	PG Diploma Robotics
C2	Make effective use of a range of programming languages, operating systems, design support tools and development environments for robotics
C3	Specify, design, implement, test and document a robot-based system
	MSC Robotics
C4	Propose, plan, undertake and report a self-directed individual programme of investigation, design and implementation
C5	Undertake a significant computing related thesis which involves an analytical, rigorous and critical approach to problem identification, solution and evaluation
C6	Synthesise the knowledge, skills and theories from the computing areas covered by the programme in order to solve a complex problem that may require the integration of different robotic techniques and / or technologies

	Practical, Professional and Employability Skills
	PG Certificate Robotics
D1	Engage effectively in a range of independent roles; debate in a confident, professional manner; produce detailed critiques and coherent project reports to professional standards; give confident, high-quality oral and other presentations in a wide range of contexts appropriate to the specialist area of robotics.
D2	Practise and demonstrate professional competence in the full range of numerical/mathematical skills associated with the specialist area of robotics
D3	Practise and demonstrate professional competence in the full range of IT skills associated with robotics.
D4	Work autonomously or with minimal guidance where appropriate, directing and managing own learning using the full range of resources and study techniques appropriate to the specialist area of robotics.

	Practical, Professional and Employability Skills
	PG Diploma Robotics
D5	Interact confidently and effectively within a range of learning and professional groups, as appropriate to the specialist area(s) covered by the programme; demonstrate appropriate negotiating, role, leadership and group-support skills to professional standards.
	MSc Robotics
D6	Produce a detailed, professional research report/dissertation/thesis or other suitable research output to the specification laid down for the advanced independent-study project; present and defend this against in-depth examination in an appropriate live context.
D7	Demonstrate mastery of the specialist numerical/mathematical skills associated with the particular area in which the 'Masters' stage advanced independent-study project is carried out, including appropriate data analysis/statistical skills
D8	Demonstrate mastery of the specialist IT skills required to carry out the 'Masters' stage project, including research skills, data-analysis skills, data-presentation skills and document-production skills.
D9	Work autonomously or with minimal guidance where appropriate, direct and manage own development of mastery of the various research-methodology skills associated with the 'Masters' stage project.
D10	Demonstrate the various skills required to work effectively with a research supervisor and with any other support staff

19 Curriculum matrix

To demonstrate how the overall programme outcomes are achieved and where skills are developed and assessed within individual modules.

Module Title		Post Graduate Study and Research Methods	Future and Emerging Technologies	Advanced Artificial Intelligence	Robotic Software Engineering	Robotic Applications in Society	Computational Robotics	Dissertation
Level 7	A1	×	×	×	×	×	×	
	A2	×	×	×	×	×	×	
	A3				×		×	
	A4	×	×			×	×	
	A5	×	×	×		×		
	A6				×	×		×
	A7	×						×
	B1	×	×	×	×	×	×	
	B2	×	×	×		×	×	
	B3	×	×			×		
	B4	×	×			×		
	B5				×		×	
	B6							×
	B7							×
	B8							×
	B9							×
	B10							×
	C1			×	×	X	X	
	C2			×	×		×	
	C3		×			×	×	
	C4	×						
	C5							×
	C6							×
	D1	×	×			×	×	×
	D2	×		×	×		×	×
	D3	×	×	×	×	×	×	×
	D4	×	×	×	X	X	X	×
	D5		×					×
	D6	×	×			×		×
	D7	×						×
	D8	×	×					×
	D9	×	×					×
	D10	×	×					

20 Learning and teaching strategy

MSc Robotics will adopt the Computing subject area Learning, Teaching and Assessment strategy. It seeks to assist the student to become an independent learner while still supporting the students in their transition to postgraduate education. The curriculum is designed to encourage an appreciation for learning. Learning is enriched by appropriate underpinning, current research, industrial applications and the development of transferable skills.

Postgraduate teaching focuses on depth of study, critical awareness and evaluation in selected areas of current research and advanced scholarship within the academic discipline of Robotics; while at the same time ensuring a more general all round ability. In addressing these aims, the postgraduate MSc programme in Robotics includes material on the theory, design and implementation of state of the art robot systems while at the same time focusing on particular specialist areas of research within the academic discipline.

There is a specialist lab (C116) which has been configured to accommodate the Baxter and NAO robots that have been purchased specifically for use in this programme. Additionally there are a number of specialist computer labs on the Wrexham campus, including B117, B119 (programming laboratories) and B121 laboratory (a networking laboratory) that support the teaching. These specialist labs offer access to a range of software that is utilised within the modules defined in the programme. Students normally undertake pre-prepared tutorials and work in pairs on equipment. An additional laboratory is available to enable students studying for the dissertation part of the course to have access to equipment over extended periods.

The pace of delivery and range of syllabus content to be covered at the taught stage requires a combination of teaching and learning strategies to be adopted in most areas of study. Modules are in the main divided into 2 types, technical and more general. Technical modules cover the specialised area of Robotics while the more general modules cover other areas of professional development and research.

Robotic Software Engineering, Computational Robotics and Advanced Artificial Intelligence modules will be based on a series of lectures followed by practical tutorial work based in the specialised laboratories.

Robotic Applications in Society will be based on a series of lectures followed by extensive research.

For the more general modules, lectures are used to present core elements of the syllabus and are the main delivery mechanism, typically supplemented by supervised problem solving and group discussion.

Post Graduate Study and Research Methods provides students with a knowledge of methods used to carry out research as well as supporting skills and professional issues related to a career in the commercial world of computing. The module will provide the necessary underpinning skills to ensure that competent work and standards are achieved and maintained throughout the student's chosen programme of study. This will encompass the development of professional level information handling and analysis skills, as well as ensuring students become proficient at recognising and managing their own professional development (PDP).

The other general module is called Future and Emerging Technologies and is intended to explore emerging and future technologies in Computing; to investigate novel

application areas and environments where Computing can be potentially beneficial; to consider the legal, ethical and cultural implications that future technologies may impact on; and to use appropriate research methods and forecasting techniques to make and justify credible predictions in Computing. The basis of the module is to run it on a split basis, a series of lectures given by specialists in the field and then student-led seminars which requires the students to present selected topic areas to their peers and members of staff.

In the early stages of each module, problems will be well-defined and limited in scope and scale. At later stages, problems will become less structured (to encourage reflection on problem issues) and open-ended (to give scope to propose and evaluate alternative solution strategies). Case studies are used extensively to integrate study topics and to underline vocational relevance. Coursework assignments are important throughout.

As the programme progresses, students are expected to demonstrate increasing proficiency in use of IT tools and techniques to support production of technical documentation, to enhance oral and written presentations, and to aid organisation of personal study material.

Part 2 of the programme is the Dissertation and is an area that has been given special consideration since it is such a significant piece of work undertaken by the student. While students study the taught part of the course they are given a 1 hour a week special lecture to inform them of the requirements of the Dissertation. This module is run so that it coincides with the end of the taught part of the course which means that on completion of Part 1 students can then start immediately on producing the proposal for the dissertation. On submission of the proposal it is assessed and passed to an appropriate supervisor with expertise in the area that the student wishes to carry out the work. It is the supervisor's task to work with the student to improve the proposal to a level that is acceptable and achievable for a Masters level within the time constraints. Students work independently on the dissertation having regular meetings with the supervisor. It is important that the student identifies at the proposal stage the various requirements needed to complete the dissertation e.g. equipment, software, space.

21 Work based/placement learning statement

Work placement is not offered on this programme.

22 Welsh medium provision

In line with University policy, students are entitled to submit assessments in the medium of Welsh. There is currently no opportunity for any part of the programme to be delivered through the medium of Welsh. It is the responsibility of students who wish to be assessed through the Welsh medium to ensure that they inform the programme team of their intentions. Where a qualified tutor is available, students will then be allocated to a tutor who is able to assess the work in Welsh. At present, the School does not have enough bilingual tutors or full-time academic staff capable of assessing through the medium of Welsh. If no appropriate Welsh speaking tutor/assessor is available, the written assessment will be translated into English by University qualified translators. Due to the technical nature of this programme many of the terms in Welsh are very similar to those in English.

23 Assessment strategy

Module code & title	Assessment type and weighting	Assessment loading	Indicative submission date
COMM50 Post Graduate Study and Research Methods	50% Coursework, 50% Coursework	2,000 words, 1,500 words	Tri 1 - Wk, 8 Wk 12
COMM51 Future & Emerging Technologies	70% Coursework, 30% Presentation	3,000 words, 30 mins. per group	Tr2 - Wk 10, Wk11
COM722 Advanced Artificial Intelligence	50% Coursework, 50% Coursework	2,000 words, 2,000 words	Tr1 – Wk 6, Wk11
COM727 Robotic Software Engineering	50% Coursework, 50% Coursework	2,000 words, 2,000 words	Tr1 – Wk 5, Wk14
COM726 Robotic Applications in Society	40% Case Study, 60% Reflective Practice	1,500 words, 2,500 words	Tr2 – Wk5, Wk12
COM725 Computational Robotics	100% Coursework	3500 words	Tr2 – Wk14
COMM56 Dissertation	10% Research proposal, 90% Dissertation	2,000 words either 15,000 – 20,000 words or 17 Page Journal Paper	Tr3

24 Assessment regulations

Taught Masters, Postgraduate Diplomas, Postgraduate Certificates

Derogations

None

Non-credit bearing assessment

None

Borderline classifications (for undergraduate programmes only)

N/A

Restrictions for trailing modules (for taught masters programmes only)

All modules except for COMM50 Post Graduate Study and Research Methods would be eligible for trailing

25 Programme Management

Programme leader

Dr John N. Davies

Programme team

Prof Vic Grout
Prof Rich Picking
Dr Stuart Cunningham
Dr Nigel Houlden
Denise Oram
Dr Bo Liu

Supporting Team

John Worden

Bindu Jose
Julie Mayers
Jason Matthews
Rich Hebblewhite
Nathan Roberts
Stephen Caulder

Quality management

The programme will be managed under the auspices of the School of Applied Science, Computing and Engineering and the programme will develop and operate within the terms of the overall management of curriculum within the School.

However, there will be a designated MSc Programme Leader for Robotics who will be responsible for the day-to-day running of the programme, including the following:

- The management and development of curriculum and the course portfolio
- Student tracking and student records
- Collation of assessment data and presentation of data at assessment boards
- Management/co-ordination of overall assessment activities across the programme
- Liaison with external bodies and agencies,
- Quality assurance and annual monitoring, including compilation of the Annual Monitoring Report
- Co-ordination of admissions activities and other recruitment activities, including relevant publicity activities

At module level there is devolved responsibility for the following:

- The maintenance and development of teaching and learning materials for all students enrolled on the module,
- The publishing and updating of module timetables, which shall include a weekly schedule of module sessions and required reading, to be distributed to students at the start of all modules
- The setting, marking and collation of marks for all module assessments and examination papers, including resit assessments, and submission of student results to the Programme Leader
- Tutorial support for students taking the module which they are responsible
- Quality monitoring, including processing of annual student feedback questionnaires and, where appropriate, student feedback for individual modules
- Liaison with part-time members of staff involved in module teaching

Student Feedback

The University has procedures in place for the regular review of its educational provision, including the annual review of both modules and programmes which draw on feedback from such sources as external examiners' reports, student evaluation, student achievement and progression data. In addition, programmes are subject to a programme periodic review (PPR) and re-validation in year 5 that includes external input.

Feedback from students plays a critical part in informing the School's strategic thinking. It also allows the School to evaluate how its service provision is viewed by its most important group of stakeholders, its students.

Students can provide feedback in a number of ways:

Staff-Student Consultative Committee (SSCC): Chaired by a member of academic staff from outside the programme, will be held at least once per trimester. The Chair will minute student feedback for action/response by the Programme Leader. Minutes of the SSCCs and the response from the Programme Leader will be posted on the programme pages of Moodle. The MSc Robotics will have a representative on the Computing Student Staff Consultative Committee.

Student Evaluation of Modules (SEM): Module Leaders will distribute SEMs at the end of each module. A summary of the analysis of the SEMs, along with any other feedback (e.g. from the student suggestion box), will be passed to the Programme Leader for action/response.

Students submit work in a number of different ways depending on the module being studied. Wherever possible Moodle is used for electronic submission and Turnitin to check the similarity score and tutors give feedback via this interface within 3 weeks. However due to the nature of Computing it is not possible to do this with programming modules.

Practical work in the programming modules are implemented by getting the student to demonstrate their work, again immediate feedback is given. At the end of a module, overall feedback is provided along with a clear indication of what area the student needs, if necessary, to resubmit or what areas were good and which areas can be improved on.

Research and scholarship activity

The School believes that students learn best in a research oriented environment taught by people working at the forefront of their disciplines. The skills and expertise in the School are augmented by the presence of the Centre for Applied Internet Computing (CAIR) which has now been encompassed into the Creative and Applied Research for the Digital Society (CARDS) Research Centre, where staff are researching in the areas of Robotics, Computer Programming and Software Engineering, Science and Internet Technologies, Mobile Communications, Web systems, Security and Computer Forensics, Computer Graphics, Media Technologies, E-Commerce and business impact.

Current research projects include:

- Computer Music and Audio
- Metrics for determining network stability
- Social and Behavioural Algorithms
- Computational mathematics
- Combinatorial optimisation and network algorithms
- Information Systems Failure
- Intelligent user interface design and adaptive tutoring systems
- Games Technology
- Routing algorithms and protocols
- Database optimisation

- Search engines
- Holistic visualisation of distributed knowledge
- Security and security visualization
- Complex decision analysis
- Wireless network optimisation
- Standardisation of reusable interface components
- Computing and Internet Ethics
- e-Learning/Business/Commerce
- Teaching and learning in IT
- Demotic and Remote-Controlled Home Automation Systems
- Document compression and transmission.

The Research Centre - Creative and Applied Research for the Digital Society (CARDS) has taken over the Centre for Applied Internet Research (CAIR) which has built up its activities very impressively over the past four years. The commitment and enthusiasm of the staff is very evident and significant outputs have been achieved over a whole range of activities, covering publications, grant winning, conference organisation, industrial engagement etc.

Significant achievements during the recent past include the very professional organisation of a conference to the highest international standards; the development of a large-scale EU-funded research project, the steady production of conference publications, in addition to a sound proportion of academic journal publications; the setting up of a usability laboratory - a relatively unique facility in Wales; the importing of a substantial new base of specialism in wireless technologies and a success in a radio frequency identification tagging (RFID) project, which is intended to be rapidly grown into an additional research theme.

This particular success formed part of an undergraduate student project, emphasising the integration of teaching and research. Staff on this programme team are very active in undertaking research, scholarship and professional activities, as reflected in an expanding published output, a significant grant-funded research project (and bids for new examples), growing numbers of Knowledge Transfer Partnerships, and the very successful conference series organised within the Research Centre.

For their dissertations/theses, students will be expected to investigate cutting-edge technologies, implement and test novel / innovative science or commercial solutions or develop or analyse original computer science applications / techniques. A series of lectures are provided to introduce students to the process and students are encouraged to select their own topic with help from a supervisor.

In previous years some excellent publishable work has been produced in particular in the last 3 years in excess of 10 papers have been published based on the dissertation work.

26 Learning support

Institutional level support for students

The University has a range of departments that offer support for students, including:

- 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' Guild

School support for students

Every student is allocated a personal tutor in the first weeks of the programme. The personal tutor is someone students can contact to discuss any problems of a non-academic nature. These may relate to special needs or personal problems that may affect the student's academic performance.

Another forum for discussion is the Staff Student Consultative Committee. Student representatives, who are elected by the students, meet lecturing staff on the programme once a trimester to exchange ideas about the programme. This allows students to communicate their shared concerns in an informal manner, and for the staff to react and respond speedily to address their concerns.

Programme specific support for students

Students on the programme will receive the following forms of student support and guidance:

- Admissions. All students on the programme will have the opportunity to discuss their application with staff, and receive appropriate advice and guidance prior to admission. This will include a review of expectations of the programme and clarification of workload and requirements.
- Induction. New students on the programme will undergo an induction programme which will provide them with a full introduction to the programme, and will include elements of work on study skills and professional development.
- Student Handbook. All students on the programme will receive a Student Handbook which will contain details and guidance on all aspects of the programme and forms of student support and guidance, programme-based, and School-based.
- Progress Review and Attendance Monitoring. Student attendance will be subject to regular monitoring through registers, and this will be a means of addressing issues of student support. There will also be regular reviews for each student with personal tutors.

Additional support for International students

There is network of support that is available at many different levels within the University and these combine to provide a supportive framework for the international students.

Specifically, this includes two main activities:

- The University offers English language classes alongside studies that improve not only spoken and written English but also academic English. Classes take place weekly and are delivered by the University's English language tutors. They also help students to integrate into the life of the local community as well as helping them develop transferable skills such as practical, research and report-writing skills.
- An induction / orientation course that precedes the start of formal teaching and that allows the international students to become familiar with the University and studying at the University while at the same time outlining some of the cultural differences that exist between their country of origin and the UK.

27 Equality and Diversity

Glyndŵr University is committed to providing access to all students and promotes equal opportunities in compliance with the Equality Act 2010 legislation. This programme complies fully with the University's policy on Equality and Diversity, ensuring that everyone who has the potential to achieve in higher education is given the chance to do so, irrespective of age, gender, disability, sexuality, race or social background.