PROGRAMME SPECIFICATION

Awarding body/institution	Glyndŵr University
Teaching institution (if different from above)	Glyndŵr University
Details of accreditation by a professional, statutory or regulatory body (including link to relevant website)	N/A
What type of accreditation does this programme lead to?	N/A
Is accreditation in some way dependent on choices made by students?	N/A
Final award/s available eg BSc/DipHe/CertHE	MSc Computer Networking, PGDip Computer Networking, PGCert Computer Networking
Award title	Computer Networking
JACS 3 code	I120
UCAS code (available from Admissions)	N/A
Relevant QAA subject benchmark statement/s	The Quality Assurance Agency for Higher Education 2011 (ISBN 978 1 84979 284 4) defines Computing as: “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”.
Other external and internal reference points used to inform the programme outcomes	

Mode/s of study *(p/t, f/t, distance learning)*	Full Time
Language of study	English
Date at which the programme specification was written or revised	September 2014

Criteria for admission to the programme

The MSc Computer Networking is intended for graduates who already have a first degree in Computer Science or a closely related subject, and who wish to extend the knowledge gained in their undergraduate study with more advanced specialised material reflecting current research at the "cutting edge" of the discipline.

General Academic 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. In some cases applicants with substantial commercial or industrial experience can be accepted, subject to interview and references.

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.

Applicants whose first language is not English, or whose Bachelor degree is not from a university in an English speaking country, are required to provide evidence of proficiency in English by having attained an IELTS certificate or its equivalent.

English test & Minimum score:

Postgraduate study	IELTS 6.5 (no band lower than 6.0)

Students should have achieved IELTS scores within the previous 2 years.

Pre-sessional English language courses are available at the University Second Language Learning Centre for students who wish to improve their language skills prior to commencing their studies.

AP(E)L

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

Aims of the programme

This programme is primarily designed to give students a much deeper set of skills, knowledge, and experience in the area of Computer Networks. The level of this programme of study ensures

that students exiting the programme are equipped with a deep suite of theoretical, academic, evaluative, and vocational expertise. Students will develop their critical thinking skills and their ability to have the foresight to deal with the increasingly challenging and changing nature of the field. The programme is intended for students with previous knowledge of, or experience in, computer science, networking or data communications. It is appropriate for Computer Networks (or similar) graduates or those with existing experience in the networking industry looking to take both their knowledge and skills to the next level. To this end the industry standard Cisco Academic Academy, Network Associate and Network Professional structure has been incorporated into the programme.

The programme aims to provide the students with the following:

- a systematic understanding of network structure and data communications principles, and a critical awareness of current technologies, existing and emerging technological difficulties and new technological insights, a significant part of which takes place at either research topic or professional 'expert' level
- a comprehensive understanding of the networking and data communications hardware and software areas that apply to their research or advanced scholarship
- originality in the application of relevant technology, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in professional networking
- conceptual understanding that enables the student:
    - to evaluate critically current research and advanced scholarship in data communications and networking
    - to evaluate networking and other technological methodologies and develop critiques of them and, where appropriate, to propose new approaches and solutions

Distinctive features of the programme

The MSc in Computer Networking focuses on practical networking rather than abstract concepts in Data Communications. Although the necessary background is introduced as appropriate, the course on the whole deals with problem-solving and the provisioning of real network services using current and emergent network hardware and protocols along with the development of applications to exploit these technologies. In addition to developing an understanding of underlying principles, students are engaged in the practical application of network design, implementation, trouble-shooting and management for real-world problems. The practicalities of network troubleshooting are embedded deeply. At all stages of the programme, appropriate reflection on their progress and development will be a requirement of progress. For their dissertations/theses, students will be expected to investigate cutting-edge technologies, implement and test novel networking solutions or develop or analyse original network applications.

Successful completion of the programme enables students to derive greater focus in their future career and educational paths, providing the knowledge and competence necessary to continue to develop professionally in the workplace and giving the opportunity to progress to higher-level academic investigation. It is expected that students will be able to gain employment at higher technical, administrative, decision-making and managerial levels, develop particular specialist technical and consultative skills, and be capable of embarking upon Doctoral level study.

One of the significant advantages of undertaking the MSc in Computer Networking is that it prepares students for the external Cisco CCNA qualification. Modules within the programme include all the material necessary to take this qualification externally. Cisco on-line tests and

practical tests are incorporated into the earlier technical modules and this enhanced by the students studying further modules on the CCNP curriculum. Since the Cisco Academic Academy is an International qualification a number of UK and International students have gained this qualification.

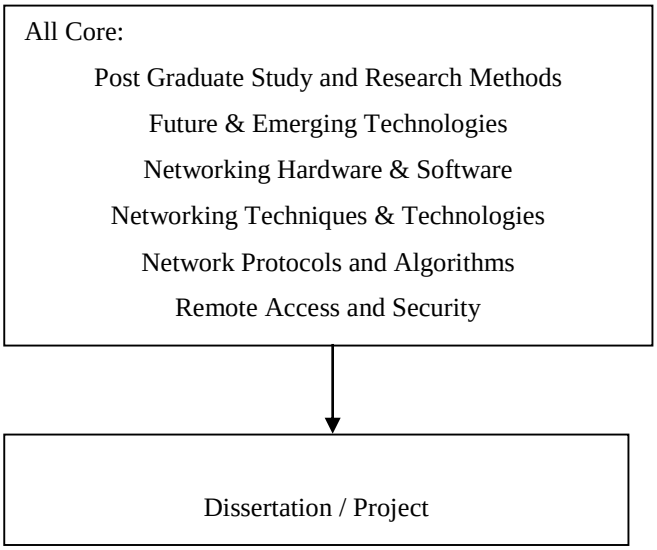
When designing this curriculum the programme team based the decisions on the previous 7 years' experience of running this course. In particular discussions have taken place with Universities who provide students for the programme and the Computing Industrial Liaison Group.

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

The programme is offered in full-time mode only at this stage. In full-time mode, the entire MSc syllabus may be completed in 12 months. The intermediate qualifications of PGCert (Postgraduate Certificate) and PGDip (Postgraduate Diploma) may be awarded after completing three (60 credits) or six (120 credits) modules respectively.

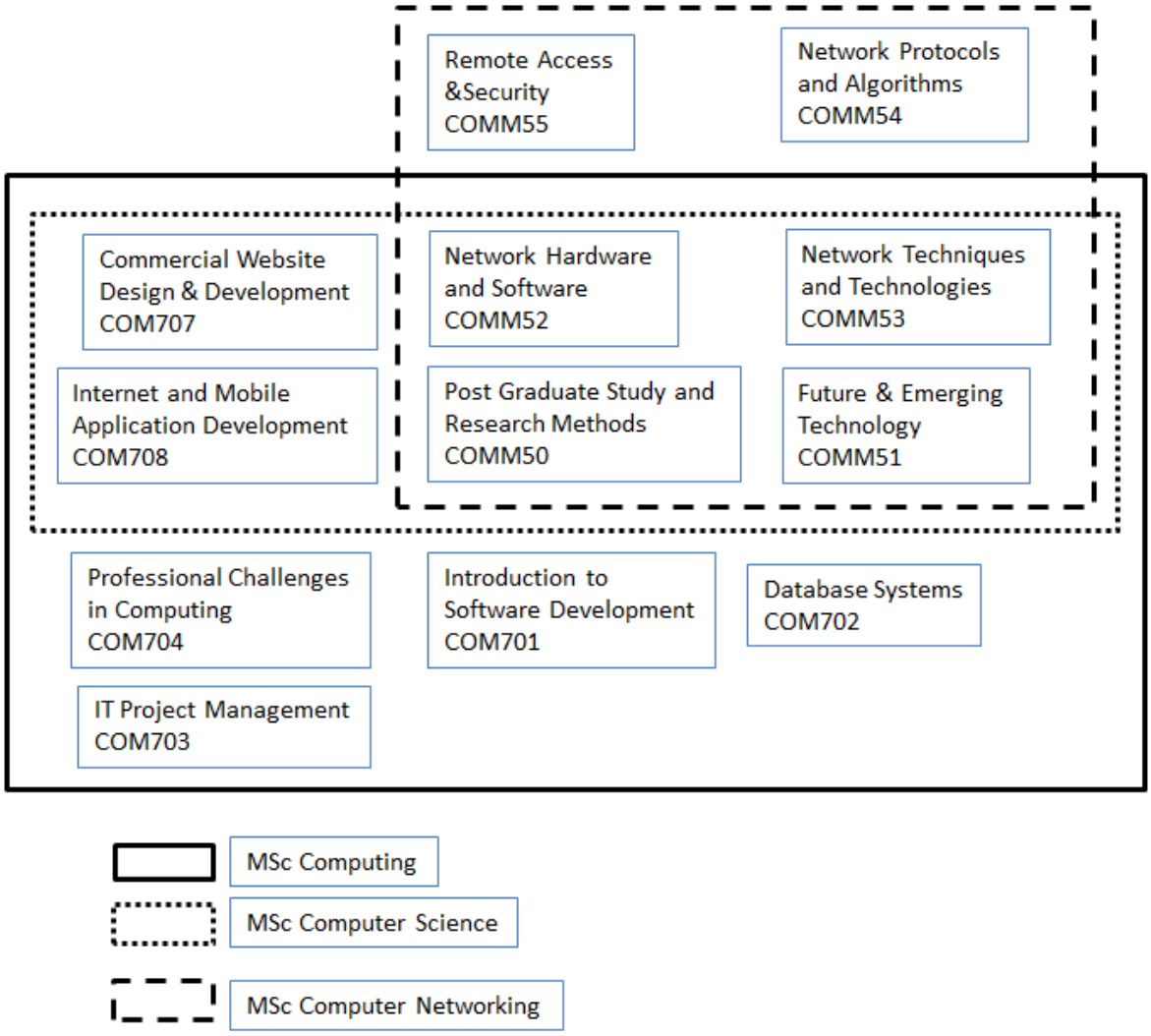
As with most masters programmes the MSc in Computer Networking has 2 parts, a taught part and then the dissertation. Students study 120 credits taught modules made up of 6 20 credit modules followed by a 60 credit dissertation making a total of 180 credits. The structure and the modules can be seen in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

Stage One



Stage Two

The intermediate qualifications of PGCert (Postgraduate Certificate) in Computer Networking and PGDip (Postgraduate Diploma) in Computer Networking may be awarded after completing three (60 credits) or six (120 credits) modules respectively. The diagram seen below indicates the award.



Students with 20 credits in either or both the Network Protocols and Algorithms or Remote Access and Security will obtain the award with the title Computer Networking.

Award	***Credits at level 7***	***Modules Required***
MSc Computer Networking	180 credits	6 modules + dissertation
Postgraduate Diploma Computer Networking	120 credits	6 modules
Postgraduate Certificate Computer Networking	60 credits	3 modules including either Remote Access and Security And / or Network Protocols and Algorithms

Full Time

In full-time mode, the entire MSc syllabus may be completed in 12 months. Modules are equivalent to 20 credits. Typically, a full-time student studies modules equivalent to 60 credits per trimester (normally 3 modules), with 14 weeks of teaching, revision and assessment activities for each module. These are normally studied in trimester 1 and 2. The full degree scheme, including submission of the dissertation is normally completed in. Trimester 3.

Students are expected to attend lectures, tutorials and practical session as specified in the Glyndŵr University timetables. Additionally for the networking modules students will be expected to study on-line material which is part of the Cisco Networking Academy.

Typical Full time delivery September start at the Wrexham Campus

Level 7 Part 1	Tri 1	Post Graduate Study and Research Methods COMM50 20 Credits - Core Mod Leader: S. Cunningham	Network Hardware and Software COMM52 20 Credits - Core Mod Leader: J Davies	Network Techniques and Technologies COMM53 20 Credits - Core Mod Leader: J Davies
	Tri 2	Future & Emerging Technologies COMM51 20 Credits - Core Mod Leader: V Grout	Network Protocols and Algorithms COMM54 20 Credits – Core Mod Leader: J Davies	Remote Access and Security COMM55 20 Credits - Core Mod Leader: J Davies
Level 7 Part 2	Tri 3	Dissertation COMM56 60 Credits – Core R Picking		

Intended learning outcomes of the programme

On successful completion of the programme a graduate should demonstrate knowledge and skills as follows:

PG Certificate Computer Networking

A: Knowledge and Understanding

A1 Demonstrate a mastery of various contemporary hardware and software networking technologies in both theory and practice

A2 Make professional judgements in the selection of technologies for complex and dynamic networking scenarios

B: Intellectual Skills

B1. Implement existing and emerging network technologies in hardware and software

B2. Work independently, under supervision and as part of a team in solving complex networking problems

C: Subject Skills

C1. Act independently in assessing networking requirements or problems in solving professional level networking problems

C2. Identify and review their own needs and expectations using the PDP process

D: Practical, professional and employability skills

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(s) covered by the programme.

D2. Practise and demonstrate professional competence in the full range of numerical/mathematical skills associated with the specialist area(s) covered by the programme.

D3. Practise and demonstrate professional competence in the full range of IT skills associated with the specialist area(s) covered by the programme.

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(s) covered by the programme.

PG Diploma Computer Networking

Students will be expected in addition to the skills developed at the PG Certificate stage to:

A: Knowledge and Understanding

A3 Where appropriate, distinguish between or combine the principles of design and implementation in the production of new networking solutions or in the enhancement, modernisation or troubleshooting of existing solutions

A4 Give an account of current and emerging developments in Internet technology

A5 evaluate and progress their own performance on both a technological level and with consideration to professional codes of IT and networking practice and ethics.

B: Intellectual Skills

B3. Critically evaluate, and where appropriate make use of, current networking research in practical scenarios

B4. Synthesise complex, often contradictory, information from a range of sources in evaluating network technology or solving networking problems

C: Subject Skills

C3. Work to deadlines, with or without supervision, and take responsibility and account for their own actions

C4. Make the transition from design principles to implementation practice in an industrial setting

C5. Inter-relate technological concepts and issues from current and emerging practice and from published sources

D5. Interactive and Group Skills: 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.

D: Practical, professional and employability skills

D6. Demonstrate evidence of networking skills and abilities equivalent to those required for a professional level networking qualification

D7. Demonstrate highly-developed problem-solving skills in practical networking scenarios

D8. Demonstrate inter-personal and management skills in practical networking scenarios

D9. Demonstrate the ability to write for publication and professional documentation

D10. Apply and integrate a range of design and technical features by implementing and publishing dynamic technical information

MSc Computer Networking

The 'Masters' stage of the programme will build upon the knowledge and understanding developed at the PG Diploma stages by providing knowledge and understanding of those aspects of research methodology that are appropriate to the specialist area(s) covered by the programme. It will also require the student to develop detailed knowledge and understanding of the particular area in which the advanced independent-study project associated with the 'Masters' stage of the programme is carried out.

Students will again be expected in addition to the understanding developed at the PG Diploma stage:

A: Knowledge and Understanding

A6. Utilise information resources and demonstrate how to access these to obtain state-of-the-art knowledge of current computer network technology

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

A8. Demonstrate clear and confident understanding of appropriate research methodology and detailed understanding of the particular area in which the 'Masters' project is carried out.

B: Intellectual Skills

B5. 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.

B6. Demonstrate mastery of the analytical skills associated with the 'Masters' stage project, again working autonomously or with minimal guidance where appropriate.

B7. 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.

B8. 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.

B9. 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.

C: Subject Skills

C6 : Undertake a significant computer Networking related dissertation which involves an analytical, rigorous and critical approach to problem identification, solution and evaluation;

C7 : Synthesise the knowledge, skills and theories covered by the programme in order to solve a complex problem that may require the integration of different computing techniques and / or technologies

D: Practical, professional and employability skills

D11. 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.

D12. 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.

D13. Demonstrate mastery of the specialist IT skills required to carry out the 'Masters' stage project, including search skills, data-analysis skills, data-presentation skills and document-production skills.

D14. 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.

D15. Demonstrate the various skills required to work effectively with a research supervisor and with any other support staff

CURRICULUM MATRIX

Module Title		Post Graduate Study and Research Methods	Future and Emerging Technologies	Networking Hardware and Software	Networking Techniques and Technologies	Network Protocols and Algorithms	Remote Access and Security	Dissertation
Level 7	A1			×	×	×	×	
	A2	×	×		×		×	
	A3				×			
	A4		×			×		
	A5	×					×	
	A6							×
	A7							×
	A8							×
	B1		×	×	×	×	×	
	B2	×	×	×	×	×	×	
	B3					×	×	
	B4	×	×	×		×	×	
	B5							×
	B6							×
	B7							×
	B8							×
	B9							×
	C1			×	×	×	×	
	C2	×	×	×			×	
	C3	×	×	×	×	×	×	
	C4						×	
	C5	×	×	×	×	×	×	
	C6							×
	C7							×
	D1	×	×		×		×	
	D2	×		×	×	×	×	
	D3	×	×	×	×	×	×	
	D4	×	×	×	×	×		
	D5		×				×	
	D6			×	×	×	×	
	D7			×	×	×	×	
	D8			×	×	×	×	
	D9	×		×		×		
	D10						×	
	D11							×
	D12							×
	D13							×
	D14							×
	D15							×

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

The Computing Department area has a Learning, Teaching and Assessment implementation plan as part of wider Institute and University developments. This seeks to assist the student to become an independent learner whilst still supporting the students in their transition to higher 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

The Department has the broad aim in its postgraduate teaching to focus on depth of study, and critical awareness and evaluation, in selected areas of current research and advanced scholarship within the academic discipline of Computer Science; while at the same time ensuring a more general all round ability. In addressing these aims, the postgraduate MSc programme in Computer Networking includes material on the theory, design and implementation of large computer networks while at the same time focusing on particular specialist areas of research within the academic discipline of Computer Science.

There are a number of specialist computer labs, including a Cisco networking laboratory which teaching is based around. These specialist labs offers access to a range of software that is utilised within the modules defined in the programme.

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

Technical modules have to be delivered sequentially since they build on the knowledge gained in the earlier modules.

The Cisco Network academy is used as the basis for these modules the Cisco Network Academy – Network Associate (CCNA) for Networking Hardware & Software (NHS) and Networking Techniques & Technologies (NT&T)

Cisco Network Academy – Network Professional (CCNP) is based around for Network Protocols & Algorithms (NPA) and Remote Access & Security (RAS). Initially the first two modules map to 2 Cisco modules but the second 2 map to individual modules of Cisco since they are far more complex in nature.

One of the advantages of following the Cisco structure is that each module is divided into a number of chapters, approx. 10, that cover different topics. Since students have Cisco Academy ids then they are able to login-in on-line and try end of chapter tests. This gives the student the opportunity to identify areas that they don't understand and can therefore seek help from the lecturer or tutorial supervisor.

Cisco Network Academy provides excellent on–line material and is kept up to date by the academy, there being significant upgrade every 3-4 years reflecting the changing nature of the subject area.

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. Students would normally study the Post Graduate Study and Research Methods module first since this gives them an insight into how to carry out research at the Master's level. Carrying

out critique on academic papers in the area of Computer Science is a significant aspect of this module and there is an assessment associated with this.

The other general module is called Future and Emerging Technology and is intended, as the name implies, to introduce latest areas of technology to the students. Student-led seminars are the basis of the module 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 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, 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. Whilst 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 with in 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.

Welsh Medium Provision

There is currently no opportunity for any part of the programme to be delivered through the medium of Welsh, but in line with the University's Welsh Language Scheme, students are entitled to submit assessments in Welsh if they so wish. 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 Department does not have enough bilingual tutors or full-time academic staff capable of assessing through the medium of Welsh. Where a need for Welsh medium assessment has been identified and no appropriate Welsh speaking tutor/assessor is available, the written assessment will be translated into English. This translation will be conducted by University qualified translators.

Assessment strategy used to enable outcomes to be achieved and demonstrated

The Department has an agreed Assessment Strategy for all computing programmes which provides a framework for the assessment of students' competence, knowledge and understanding, and the grading of students for progression and the conferring of awards. It allows staff to give feedback to students and to evaluate the effectiveness of their own teaching. This strategy will be closely adhered to in the delivery of the programme and is guided by QAA Code of Practice- Section 6: Assessment of Students, National Qualifications Framework, and Glyndŵr University Assessment Guidelines.

Students will receive formative assessment, particularly during the practical and self-study elements of the programme to ensure they can keep track of their progress and development. This will also be a key factor in ensuring student engagement and retention on the programme of study. In the case of practical assessment, this may be a final summative assessment, so more frequent formative assessment provides academic rigour and increases student awareness and confidence in the subject.

There will be emphasis placed upon students to undertake independent study and research activities, in particular when completing the Dissertation / Project element of the programme. This Dissertation / Project will be facilitated by a traditional summative assessment approach at the culmination of the work, however, there will be extensive use of formative feedback, milestones, and guidance from staff during this, and other, independent-study and research-based assessment undertaken by students. This is common practice for such modes of study and is in-line with the approach taken by postgraduate programmes in other HE institutions.

Assessment for the first 3 of these technical modules partially follows the Cisco academy but also includes more in depth work. Each Cisco module contains an end of Module on-line test that is run in a controlled environment. Individual end of module marks are used as a percentage of the overall mark for that module, refer to individual modules for details. Excellent reporting information is available for the results of this test and External examiners are able to access this information if so required. A practical test is also included in each module to enforce the direction of the overall programme. This test is written by the lecturers and is carried out under controlled conditions in the Cisco networking Laboratory and normally lasts for 2 hours. Students are expected to work in a group, usually pairs, to carry out this practical work. Even though the assignment is written to balance out the work that each student has to carry out marks for the assignment reflect the work carried out by the individual student. In addition to these 2 types of assessment there is also an academic paper/ design report that has to be completed which reinforces the research area and masters level of the module.

Remote Access & Security is the final technical module and is used to make the students self-reliant. They have to work as part of a group of around 4 to undertake a Case Study where they have to research, design, build, test, troubleshoot, demonstrate and document a fairly large network. It covers the major techniques studied previously and some Wide Area Networking and security issues not covered in the modules. The intention of this is to ensure the students are capable of working in a team, often with mixed languages, and are able to research specialised topics and solve problems within the technical area studied.

On submission of the dissertation the supervisor marks the work using a standard mark sheet allocating marks for specified areas. Where appropriate a student may be asked to demonstrate their work to the supervisor and second marker. All dissertations are second marked and if there is a dispute in the mark then it is moderated by a third person. On completion of this process and before the module board the External Examiner comments on all the marking.

Indicative submission dates MSc Computer Networking

Module	Core/ optional	Level/ Credit	Assessment type and weighting	Assessment loading	Approx submission
Post Graduate Study and Research Methods	Core	7/20	50% Coursework 50% Case Study	2,000 words 1,500 words	Week 4 End of tri 1
Networking Hardware and Software	Core	7/20	10% Online theory exam 1 10% Online theory exam 2 30% Practical exam 50% Coursework	1.15 hrs 1.15 hrs 2 hrs 2,000 words	Week 3 Week 6
Networking Techniques and Technologies	Core	7/20	10% Online theory exam 1 10% Online theory exam 2 30% Practical exam 50% Coursework	1.15 hrs 1.15 hrs 2 hrs 2,000 words	Week 9 Week 12 End of tri 1
Future and Emerging Technology	Core	7/20	100% Coursework	20min Presentation + 2,000 words	Week 4-11 End of tri 2
Network Protocols and Algorithms	Core	7/20	15% Online theory 20% Practical exam 65% Coursework	1.15 hrs 2 hrs 3,000 words	Week 7 Week 7 Week 8
Remote Access and Security	Core	7/20	100% Coursework	Group	End of tri 2
Dissertation	Core	7/60	Dissertation	15,000 words	End of tri 3

Assessment regulations that apply to the programme

The assessment regulations that apply to this programme is the Glyndŵr University Taught Masters.

All modules except for Future and Emerging Technologies would be eligible for trailing.

Programme Management

Programme Team
Prof Vic Grout – Head of Department
John Davies – Programme Leader
John Worden
Dr. Stuart Cunningham

Dr. Rich Picking
Denise Oram

Supporting team
Prof. P. Excell
Bindu Jose
Nigel Houlden
J. Matthews

Programme Management

The programme will be managed under the auspices of the Institute for Arts, Science and Technology Department of Computing and the programme will develop and operate within the terms of the overall management of curriculum within the Institute.

However, there will be a designated MSc Programme Leader for the MSc Computer Networking 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 Department's strategic thinking. It also allows the Department 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 – SSCCs, 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 Computer Networking has a representative on the Computing Student Staff Consultative Committee.

Student Evaluation of Module (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 feedback is given via this interface within 2 weeks. However due to the nature of Computing it is not possible to do this with programming modules and networking modules. As part of the networking modules a number of on-line tests are taken and their score is given immediately and the supervisor can highlight the areas where problems occur. Also practical work in both networking and 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, resubmit work or what areas were good and which areas can be improved on.

Students receive formative assessment, particularly during the practical and self-study elements of the programme to ensure they can keep track of their progress and development. This will also be a key factor in ensuring student engagement and retention on the programme of study. In the case of practical assessment, this may be a final summative assessment, so more frequent formative assessment provides academic rigour and increases student awareness and confidence in the subject.

Feedback is provided continuously to students through informal contact with subject lecturers and tutors in the seminar/tutorial and laboratory settings. In accordance with University Guidance, feedback is provided on assessed practical work normally within three weeks of submission of the work.

Timely feedback is given to individual students on each module. This indicates the grade obtained which areas were excellent, good or not so good. Areas of improvement are identified and in the case of a referral what work needs to be carried to gain a pass. There is a section of the pro-forma used entitled “For the future” which is intended to direct the student.

In particular the External examiner commented on the quality of the feedback given to the students and sited it as an example of good practice.

This feedback pro-forma is created for each individual student and is normally printed and handed to the student however it is available electronically if the student requests it.

Research and Scholarship underpinning the curriculum

The Department 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 Department 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 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
- Domotics 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 Networking 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.

Particular support for learning

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 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, Department-based and institutional
- 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.

Student Support

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.

Academic problems should first be addressed to the lecturer concerned. If the problem is not resolved or it does not relate to a specific module, then the Programme Leader should be contacted. A more detailed complaints procedure is given in the Student Handbook

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.

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 three main activities:

- Language provision designed to ensure that the international students have achieved a minimum level of language skills before they embark on their chosen degree programme. This is a six-week pre-sessional intensive English Language for Academic Study course that aims to bring students to an IELTS (International English Language Testing System) level of 6.5 – the standard demanded for entry into master's degree programmes.
- Glyndŵr 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 also t 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 whilst at the same time outlining some of the cultural differences that exist between their country of origin and the UK.

Facilities

There are 4 specialist IT labs used for Computing students and in addition, students have access to the University open-access computing labs and other University wide services, including the wireless network.

There is comprehensive Virtual Learning Environment (Moodle) containing a range of advice and guidance. Module lecture notes and programme content are available online through Moodle and it is used for all the modules within the programme. This enables students to gain access to tutorial work and assignments set for the various modules. Many study materials are available via Moodle such as online databases; e-journals and library catalogue information are also available online.

Equality and Diversity

The University has adopted a policy of providing equal opportunities for all its students, staff, applicants and others involved in its work. One aspect of this policy is its intention to prevent, as far as possible, the harassment of one person by another, whether on the basis of gender, sexual orientation, sexuality, race or ethnic origin, religion, disability, or any other personal attributes or views held by the person harassed.

As part of the University's Disability Policy, students with a physical disability or learning difference are encouraged to contact the University Disability Adviser to ensure their needs are acknowledged formally. The outcome of such an assessment could result, for example, in additional time being allowed for examinations, or the provision of further learning support.