Programme Specification

BSc Honours Computer Networks

1. Programme title	**BSc (Hons) Computer Networks**
2. Awarding institution	Middlesex University
3. Teaching institution	Middlesex University
4. Details of accreditation by professional/statutory/regulatory body	
5. Final qualification	BSc Honours
6. Year of validation Year of amendment	
7. Language of study	English
8. Mode of study	Full Time/ Part Time

9. Criteria for admission to the programme

Student should have the equivalent of 240 UCAS entry points to gain entry to level 4. All candidates should possess at least grade C in GCSE Maths and English language, or equivalent. For direct entry to levels 5 & 6 the student is required to pass the equivalent of 120 credits specified in the programme at levels 4 & 5, respectively. You will be expected to demonstrate the programme learning outcomes have been met at these levels, for example by attainment of industrially based qualifications such as Cisco Certified Network Associate/ Professional.

Mature applicants with relevant work experience are also welcome to apply for Direct entry at levels 3, 4 and 5. These applicants are required to submit a portfolio of work experience to show evidence of achieving relevant learning outcomes, and these will vary depending on both the programme and level the student is applying for. Evidence should comprise the applicant's own work and may include documents you have written, procedures you have designed, proposals you have drafted, electronic resources, photographs, video etc or information gathered from others about you such as statements from employers, certificates of in-house courses completed. Further guidance may be obtained from the Programme Leader or Director of Programmes.

International students who have not been taught in the English medium must show evidence of proven ability in English such as TOEFL grade 550 or IELTS grade 6.0. The University provides pre-sessional English language courses throughout the year for candidates who do not meet the English requirements. University policies supporting students with disabilities apply, as described in the University Regulations

For further information, visit the learning resources web site at:

University policies supporting students with disabilities apply, as described in the University Regulations, 'Information for students with disabilities.

10. Aims of the programme

Computer networks pervade our lives. Whether we are talking on a mobile phone, watching a video clip on YouTube or simply sending an email we are interacting with a network, or more likely, several networks. These networks are strategically important in creating a safer, more productive and intelligible environment by allowing data to be transmitted securely over almost any distance at very high speeds. Business competitiveness, personal and organisational communications are all critically dependent on well-designed network systems.

These networks, and the devices we use to access them, are changing rapidly, with mobile phones now providing us with uninterrupted connection to the internet 24/7. Studying on the BSc Hons Computer Network programme at Middlesex enables students to keep pace with this change and appreciate the ways in which the area is currently developing.

This new programme allows students to develop a significant range of networking skills highly valued and sought-after by the international network sector. These skills include the creation of networks meeting specific needs and purposes, and configuration of a variety of networks for secure operation. Students will also learn about the fundamentals of data communications theory and practice. Wherever appropriate, modern laboratories equipped with industry-standard equipment and network development tools will support the development of these skills.

The primary educational aim is to produce graduates fully prepared for a range of careers in network technology and network deployment, and capable of progressing to postgraduate study in networking.

11. Programme outcomes

A. Knowledge and understanding	Teaching/learning methods
On completion of this programme the successful student will have knowledge and understanding of: • Mathematics, physics, wireless, and communication principles relevant to the analysis and solution of a range of digital and computer communication, wireless	The curriculum has been designed to offer the opportunity of an orderly academic progression between levels of study within identifiable computer network and related themes. At Level 4, modules address the conceptual, technical and mathematical underpinnings of the study of computer

networking and telecommunication systems.

- The principal, computational concepts, scientific and engineering principles required to analyse and model routine networked systems, products and processes and collect and interpret data needed by the solution of routine design problems and to recognise their limitations.
- Criteria of quality and performance relevant to networked systems applications, design, construction or operational contexts.
- The relevance and ramifications of a *range* of professional, legal, managerial, business, organisational, ethical, social and sustainability considerations relevant to the practice of the network based systems professional;
- The significance, role and function of networked systems within society and the operational, material environment within which they will be expected to practise.
- The business, organisational and management techniques relevant to those engaging in enterprise and the production of network systems, products and processes.
- The core principles, processes and methods of design and how to apply these in the design of specific computer communication and network systems and processes.

networks. A1 and A2 are introduced in contexts relating to networks and computer communication by means of lectures, seminars and laboratories. Students are helped to understand the relevance to the development and analysis of networks systems and network applications. Set tasks are used to engender confidence and proficiency within the particular opics addressed.

Elements of A3, A4 and A6 are addressed both implicitly to motivate initial understanding and to place technical topics into a wider context Learning materials are designed to relate to computers and networks. Wherever case studies or problems concerning networks at system- (rather than topic-level) are addressed, additional learner support is offered by tutors. Problem solving and design tasks are used in seminars to reinforce and deepen understanding, and students are given the opportunity of practically applying theory in laboratory tasks and seminars.

At Level 5, there is significant horizontal integration of learning materials; for example networking concepts and terminology are introduced in one module, and in another real life scenarios (such as error correction and control) are used to deepen and refine understanding.

At Level 5, further material addressing A1, A2 and A5 is introduced. Topics introduced typically involve an increasingly systems level content and orientation as modules progress and there is an increasing emphasis on design, problem solving and analysis.

Progressively increasing levels of appreciation of quality (A3) and performance aspects of products and processes is also encouraged and expected in seminar work and coursework at Levels 5 & 6.

	Students undertake group project work addressing the development of A4, A5 and A7 in focussing on aspects of the project life cycle of a specific network system. The project is designed to allow students to integrate and contextualise their A1, A2 and A5 understanding and abilities in a supportive and semi-structured environment.
	At Level 6, students are expected to consolidate their understanding of new material and to take greater responsibility for the selection of concepts, principles and methodology needed to analyse, synthesise and evaluate particular systems, processes and products in a range of contexts (A5, A6, A7 & A8).
	Assessment Methods
	Outcomes A1, A2, A5 are assessed using coursework assignments involving a range of problem-solving, design, analysis, modelling, and simulation tasks. Individual and group work (including presentations and formal reports of work undertaken) is increasingly framed at system level. Throughout the programme multiple choice questions, presentations of work-in-progress and unseen written examinations (at Levels 5 and 6) are used for assessing knowledge and understanding.
	Typically a module will involve a variety of assessment types to target students' differing learning styles.
B. Cognitive (thinking) skills	**Teaching/learning methods**
On completion of this programme the successful student will be able to: 1. Solve technical problems creatively in problem-solving and design contexts drawing on techniques or concepts some of which are at the forefront of networking	Cognitive skill development within this programme is intended to be progressive across all study levels. A variety of computer network and electronics laboratories and equipment provide environments

development or research, and to deal with issues creatively in the presence of incomplete data.

2. Select from an extensive range of computer-based, mathematical and analytical methods as appropriate to solve particular design or developmental problems.

3. Select appropriate software and/or hardware components or processes in order to satisfy particular sets of requirements and objective constraints on the basis of an accurate and critical understanding of their material and operational characteristics.

4. *Critically* evaluate technical information, concepts, arguments and assumptions and evidence derived from a wide variety of sources; to abstract from such information, to correctly apply those concepts and restate arguments and assumptions in a variety of ways appropriate for a given cognitive end or purpose

5. Engage effectively in tasks requiring initial problem identification and to effectively apply relevant fundamental principles and techniques appropriate to the analysis and solution of a *range* of technical problems.

6. Analytically report on a piece of original external research or scholarly activity.

   Classify and describe system or component performance through the use of analytical methods and modelling techniques

and tools for system design, simulation, and test. These are used to foster the development of cognitive skills through a range of laboratory and/or seminar-based tasks typically relying on learning-in-action.

These supportive environments allow the development of B1-B7; with formative feedback being provided by tutors within laboratories and seminars prior to assessment, and then more formal feedback on completion of assignments.

Individual project work addresses B1 & B4, in which student learning includes an appreciation of the open-endedness and incompleteness of knowledge in practical computer communications problems at system level.

Assessment methods

Student's cognitive skills are typically summatively assessed by combinations of practical assignments, group and individual presentations, laboratory exercises, production of design documentation and specific demonstration of work, and unseen written examination. Formative feedback is given with returned assessed coursework.

C. Practical skills	Teaching/learning methods
On completion of the programme the successful student will be able to: Use specialist digital, wireless and network laboratory equipment safely and effectively in all phases of network systems	Transferable skills are developed initially at Level 4 where communication skills, basic research skills and skills in using mathematical principles and concepts are developed. The ability to work effectively both as an individual and as a group member is summatively assessed at Level 4 both in seminars and

development.

Conduct experiments, simulation and modelling tasks with minimal

guidance, and report effectively on findings;

Use technical literature effectively and conduct a specialist literature **review;** plan and conduct a technical investigation using a wide range of technical literature

Model hardware systems and   component functionality, and prototype a range of digitally-based computer communication systems or processes

Document design and analytical work appropriately; commission, research, and sustain individual project activity and to report on findings in a defensible fashion relying on minimal supervision;

Develop and evaluate range of network-oriented applications or products typically involving the substantive integration of hardware and software components and fulfilling a given set of requirements; document design and analytical work appropriately.

Use a range of software and hardware design/engineering tools, and environments effectively

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laboratories.

At Level 4 students become involved in many different activities requiring the exercise of C1-C5 and are supported by regular and frequent formative feedback in laboratories and seminars

The development of transferable skills C6 and C7 is progressed at Level 5 in the contexts of group project work and, at Level 6, in that of

individual project work and other Level 6 modules.

At all levels students are taught how to operate specialist equipment effectively and safely and to respect rules of conduct in laboratories.

Assessment methods

A variety of assessment types are typically used for each of the intended transferable skills outcomes. These include seminar-based assessment, multiple-choice questions and coursework, laboratory tasks, group and individual projects, and mini-projects.

Reports reflecting research undertaken at all levels of study are assessed and formative feedback provided. Individual and group project research presentations are assessed.

D. Graduate skills

On completion of this programme the successful student will be able to:

Work effectively both autonomously in independent project- oriented activity, and co-operatively as a member of a group or project-team and manage time and other resources.

Apply mathematical skills and understanding to tasks requiring modelling, system analysis and problem-solving.

Learn effectively for life-long personal and career development and to reflect on progress of learning.

Communicate effectively and explain complex technical information,

Teaching/learning methods

Students acquire graduate skills through presentations, lab-based tasks including independent and group project work.

Assessment method

Students' graduate skills are assessed by a variety of assessment types These include seminar-based assessment, multiple-choice questions and coursework, laboratory tasks, group and individual projects, and mini projects.

Reports reflecting research undertaken at all levels of study are assessed and formative feedback

concepts, arguments, design information effectively, using a variety of media, and wide range of methods appropriate to a given type of audience or communication objective; Conduct research effectively, drawing on a wide variety of sources (including libraries, the Internet and electronic catalogues) under minimal direction, and be proficient in the use of referencing sources of information. Deploy the general design, implementation and test principles or techniques appropriate for the development of particular networking products or processes and apply a scientific approach to problem solving	provided. Individual and group project research presentations are assessed. Skills outcomes D1-D6 are designed to reflect the University's Graduate Skills requirements. Students are actively encouraged to document these skills in their Personal Development Portfolios (PDPs) .

12. Programme structure (levels, modules, credits and progression requirements)

12. 1 Overall structure of the programme

The programme can be taken in three modes (a) full-time, (b) part-time and (c) thick-sandwich mode. In full-time mode, the programme will take
three years to complete; in part-time mode the programme will take a minimum of six years to complete and (c) will take a minimum of four years to complete. The programme is structured into three academic
levels.

Each module is worth 30 credit points and so you need gain 120 credit points to progress to the next level. In part-time mode, students will take a maximum of 60 credit points in any academic year (which is defined to be the period from September t o the following September). In thick sandwich mode students spend a year on a placement module after having completed the first two academic levels, and then resume their studies by taking the specified level 6modules. Even though the placement module is credit-rated (worth 120 credit points) it does not contribute to the number of credits needed to gain the honours degree award, but leads to a certificate of industrial achievement in its own right.

In this programme all modules at levels 4 and 5 are compulsory, and at level 6 two modules are compulsory and two modules are optional. Students need 360 credit points to graduate with honours. The modules at Level 4of this programme are common to two other programmes in the CCE subject area and it is possible for students to transfer their studies to one of these programmes.

Students may be eligible for pre-accreditation of some modules, especially at Level 4 if they have already passed courses relevant to those modules and at the same academic level or if they have significant employment experience prior to starting the programme. If, on completion of studies a student fails to obtain the 360 credit points required by this programme, he/she may be eligible for graduating with a non-honours,

i.e. an ordinary degree, with 300 credit points, of which at least 60 credit points are at Level 6.

12.2 Levels and modules

Level 4 (1)

COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: **CCE1000** Computer Systems Architecture and Operating Systems **CCE1010** Programming for Data Communications and Problem Solving **CCE1020** Fundamentals of Science, Technology, Engineering and Mathematics **CCE1030** Computer Networking		Students must pass 120 credit points to progress to level 5 full-time study or level 5 part-time study

Level 5 (2)

COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS

Students must take all of the following: **CCE2060** Professional Project Development and Management **CCE2000** Data Communications **CCE2020** Protocols and Network Performance Monitoring **CCE2010** Advanced Connection of Network Devices		Students must pass at least 180 credit points (including 60 at level 5) in order to be eligible to enrol on modules at level 6, and at least 210 credits (including 90 at level 5) in order to be eligible to enrol on the level 6 Computer Communications project module (**CCE3050**). .
Level 6 (3)		
COMPULSORY	OPTIONAL	PROGRESSION REQUIREMENTS
Students must take all of the following: **CCE3050** Computer Communications Project **CCE3040** Advanced Network Design and Security	Students must also choose two from the following: **CCE3060** Network Analysis and Troubleshooting **CCE3070** Network Management: Design and Support **CCE3080** Wireless LANs and Mobile Computing **CCE3100** Distributed Systems	In order to graduate with an honours degree i.e. with a BSc Hons Computer Networks award, students must have achieved 360 credit points, or to graduate with an ordinary degree, 300 credit points with a minimum of 60 credit points at Level 6

12.3 Non-compensatable modules (note statement in 12.2 regarding FHEQ levels)	
Module level	**Module code**
Level 6	*CCE3050* (Computer Communications Project module)

13. Curriculum map
See attached.

14. Information about assessment regulations
1. Information on how the University formal assessment regulations work, including details of how award classifications are determined, can be found in the University Regulations at www.mdx.ac.uk/regulations/.
2. Practical aspects of the programme are often assessed via coursework that may be carried out using specialist software and may include lab tests.
3. Theoretical material is assessed by coursework and examinations.
4. Grades are awarded on the standard University scale of 1–20, with Grade 1 being the highest. To pass a module all components, both coursework and examination, must be passed individually with a minimum grade of 16. Failure in one of the components will result in the failure of the module. For additional information on assessment and how learning outcomes are assessedplease refer to the individual module narratives for this programme

15. Placement opportunities, requirements and support (if applicable)
All Undergraduate students have the opportunity to go on Industrial Placement. Industrial Placements are encouraged as this valuable experience enhances a student's future career prospects. Additionally students normally achieve better results in their final year. In brief: The placement provides a years experience as an appropriately paid graduate trainee. Industrial placement is conditional on the successful completion of all modules at Level 4 and Level 5; therefore students need 240 credits before they are able to embark on an industrial placement. Obtaining a placement is co-ordinated through the Campus Placement Office. For Undergraduate programmes, students wishing to undertake a placement position must register for CCE3200. Each placement will be assigned to an industrial tutor who will visit the student on placement. On graduation the degree will be qualified with the term "…with approved industrial experience". The placement option is not available to direct-entry students in their final year

16. Future careers (if applicable)

All programmes in the School of Science and Technology – their curricula and learning outcomes – have been designed with an emphasis on currency and the relevance to future employment.

    The majority of graduates are employed in IT posts relevant to the subject.

    Over 20% of students pursue further postgraduate study or research.

The employer links with the School are encouraged in a number of ways

e.g. by inviting practitioners from industry as guest speakers in lectures; through links with companies where students are employed as part of their Industrial placement and through alumni both in the UK and overseas

Campus Careers Offices can be found on each campus for advice, support and guidance – or go to www.intra.mdx.ac.uk/annex/careers/coreered.htm

17. Particular support for learning (if applicable)

The School's Teaching and Learning Strategy is compliant with those of the University, in seeking to develop learner autonomy and resource- based learning In support of the students learning experience:

    All new students go through an induction programme and some have early diagnostic numeric and literacy testing before starting their programme. Learning Resources (LR) provide workshops for those students needing additional support in these areas.

    Students are allocated a personal email account, secure networked computer storage and dial-up facilities

    New students are provided with a CD containing the Schools Subject Handbook at enrolment

    New and existing students are given module handbooks for each module they study. Soft copies of all module handbooks can be found on Oasis. Web-based learning materials are provided to further support learning

    Extensive library facilities are available on all campuses. Visit http://unihub.mdx.ac.uk/study/library/index.aspx for pages on learning resources.

    Students can access advice and support on a wide range of issues from the UniHelp Student Information Desk.

    Placements are supported by Campus Placement Offices and School academics; please refer to section 15 of this programme specification

    High-quality specialist network, software, digital and wireless laboratories equipped with industry standard software, hardware and tools as appropriate, for formal teaching as well as self-study. Middlesex University is a Cisco Local Academy and a Xilinx University partner

    Teaching staff are available for each subject offering personal academic advice and help if needed. Staff availability for this purpose is posted outside staff office doors.

    Formative feedback is given on completion of student coursework

Past exam papers with solutions and marking schemes for all modules are available for students in module handbooks

Research activities of academic staff feed into the teaching programme, which can provide individual students with ad-hoc

18. JACS code (or other relevant coding system)	I100/H100 (60%/40%)
19. Relevant QAA subject benchmark group(s)	Computing/Engineering

20. Reference points

The following reference points were used in designing the programme:

- QAA Computing subject benchmark statements, Computing (2007) and Engineering (2010)
- QAA Framework for Higher Education Qualifications in England, Wales and Northern Ireland
- QAA guidelines for programme specifications
- QAA Code of Practice for the assurance of academic quality and standards in HE
- CBI - Future Fit: Preparing graduates for the world of work, 2009. Available at: http://www.cbi.org.uk/media-centre/news-articles/2009/03/future-fit/
- UK Standard for Professional Engineering Competence; Chartered Engineer and Incorporated Engineer Standard, Engineering Council UK, 2010
- UK Standard for Professional Engineering Competence; The Accreditation of Higher Education Programmes, Engineering Council UK, 2008
- Middlesex University Learning Teaching and Assessment Strategy (2012 – 2014)
- University Regulations
- Module Narratives
- Middlesex University and School of Science and Technology Teaching Learning and Assessment policies and strategies

21. Other information

Middlesex University has formal links with 250 institutions world-wide, including student exchange agreements with more than 100 institutions. Currently a number of students both from the UK/EU and overseas take part in such exchanges. For further details please visit http://www.europe.mdx.ac.uk/

Curriculum map for *BSc Honours Computer Networks*

This section shows the highest level at which programme outcomes are to be achieved by all graduates, and maps programme learning outcomes against the modules in which they are assessed.

Programme learning outcomes

Knowledge and understanding		Practical skills	
A1	Mathematics, physics, wireless, and communication principles relevant to the analysis and solution of a range of digital and computer communication, wireless networking and telecommunication systems.	C1	Use specialist digital, wireless and network laboratory equipment safely and effectively in all phases of network systems development.
A2	The principal, computational concepts, scientific and engineering principles required to analyse and model routine networked systems, products and processes and collect and interpret data needed by the solution of routine design problems and to recognise their limitations.	C2	Conduct experiments, simulation and modelling tasks with *minimal* guidance, and report effectively on findings.
A3	Criteria of quality and performance relevant to networked systems applications, design, construction or operational contexts.	C3	Use technical literature effectively and conduct a *specialist* literature **review;** plan and conduct a technical investigation using a wide range of technical literature.

A4	The relevance and ramifications of a *range* of professional, legal, managerial, business, organisational, ethical, social and sustainability considerations relevant to the practice of the network based systems professional.	C4	Model hardware systems and component functionality, and prototype a range of digitally-based computer communication systems or processes
A5	The significance, role and function of networked systems	C5	Use a range of software and hardware

	within society and the operational, material environment within which they will be expected to practise.			design/engineering tools, and environments effectively.
A6	The business, organisational and management techniques relevant to those engaging in enterprise and the production of network systems, products and processes.	C6	Document design and analytical work appropriately; commission, research, and sustain individual project activity and to report on findings in a defensible fashion relying on minimal supervision;
A7	The core principles, processes and methods of design and how to apply these in the design of specific computer communication and network systems and processes.	C7	Develop and evaluate range of network-oriented applications or products typically involving the substantive integration of hardware and software components and fulfilling a given set of requirements; document design and analytical work appropriately.
Cognitive skills			**Graduate Skills**	
B1	Solve technical problems creatively in problem-solving and design contexts drawing on techniques or concepts some of which are at the forefront of networking development or research and to deal with issues creatively in the presence of incomplete data.	D1	Work effectively both autonomously in independent project-oriented activity, and co-operatively as a member of a group or project-team and manage time and other resources.
B2	Select from an extensive range of computer-based, mathematical and analytical methods as appropriate to solve particular design or developmental problems.	D2	Apply mathematical skills and understanding to tasks requiring modelling, system analysis and problem-solving.
B3	Select appropriate software and/or hardware components or processes in order to satisfy particular sets of requirements and objective constraints on the basis of an accurate and critical understanding of their material and operational characteristics.	D3	Learn effectively for life-long personal and career development and to reflect on progress of learning.
B4	*Critically* evaluate technical information, concepts, arguments and assumptions and evidence derived from a	D4	Communicate effectively and explain complex technical information, concepts, arguments, design

	wide variety of sources; to abstract from such information, to correctly apply those concepts and restate arguments and assumptions in a variety of ways appropriate for a given cognitive end or purpose		information effectively, using a variety of media, and wide range of methods appropriate to a given type of audience or communication objective;
B5	Engage effectively in tasks requiring initial problem identification and to effectively apply relevant fundamental principles and techniques appropriate to the analysis and solution of a *range* of technical problems.	D5	Conduct research effectively, drawing on a wide variety of sources (including libraries, the Internet and electronic catalogues) under minimal direction, and be proficient in the use of referencing sources of information.
B6	Analytically report on a piece of original external research or scholarly activity	D6	Deploy the general design, implementation and test principles or techniques appropriate for the development of particular networking products or processes and apply a scientific approach to problem solving
B7	Classify and describe system or component performance through the use of analytical methods and modelling techniques.	D7	

Programme outcomes																										
A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	
Highest level achieved by all graduates																										
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	

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A5	The significance, role and function of networked systems	C5	Use a range of software and hardware

	within society and the operational, material environment within which they will be expected to practise.			design/engineering tools, and environments effectively.
A6	The business, organisational and management techniques relevant to those engaging in enterprise and the production of network systems, products and processes.		C6	Document design and analytical work appropriately; commission, research, and sustain individual project activity and to report on findings in a defensible fashion relying on minimal supervision;
A7	The core principles, processes and methods of design and how to apply these in the design of specific computer communication and network systems and processes.		C7	Develop and evaluate range of network-oriented applications or products typically involving the substantive integration of hardware and software components and fulfilling a given set of requirements; document design and analytical work appropriately.
Cognitive skills			**Graduate Skills**	
B1	Solve technical problems creatively in problem-solving and design contexts drawing on techniques or concepts some of which are at the forefront of networking development or research and to deal with issues creatively in the presence of incomplete data.		D1	Work effectively both autonomously in independent project-oriented activity, and co-operatively as a member of a group or project-team and manage time and other resources.
B2	Select from an extensive range of computer-based, mathematical and analytical methods as appropriate to solve particular design or developmental problems.		D2	Apply mathematical skills and understanding to tasks requiring modelling, system analysis and problem-solving.
B3	Select appropriate software and/or hardware components or processes in order to satisfy particular sets of requirements and objective constraints on the basis of an accurate and critical understanding of their material and operational characteristics.		D3	Learn effectively for life-long personal and career development and to reflect on progress of learning.
B4	*Critically* evaluate technical information, concepts, arguments and assumptions and evidence derived from a		D4	Communicate effectively and explain complex technical information, concepts, arguments, design

	wide variety of sources; to abstract from such information, to correctly apply those concepts and restate arguments and assumptions in a variety of ways appropriate for a given cognitive end or purpose		information effectively, using a variety of media, and wide range of methods appropriate to a given type of audience or communication objective;
B5	Engage effectively in tasks requiring initial problem identification and to effectively apply relevant fundamental principles and techniques appropriate to the analysis and solution of a *range* of technical problems.	D5	Conduct research effectively, drawing on a wide variety of sources (including libraries, the Internet and electronic catalogues) under minimal direction, and be proficient in the use of referencing sources of information.
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Programme outcomes																									
A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7
Highest level achieved by all graduates																									
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6

Module

Module Title	Module Code and Level	Programme outcomes																									
		A1	A2	A3	A4	A5	A6	A7	B1	B2	B3	B4	B5	B6	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7
Computer Systems																											
Architecture and Operating Systems	CCE1000	x	x	x											x		x		x		x					x	x
Programming for Data Communication and Problem Solving Fundamentals of Science, Technology, Engineering and Mathematics	CCE1010		x						x	x	x								x							x	x
	CCE1020	x	x						x				x		x	x							x			x	x

Computer Networks CCE1030   x x x   x x   x

Data Communications CCE2000 x x x   x x   x   x   x   x x   x x

Advanced Connection of

										x			x		x														
Performance Modelling Research Methodology and	CCE2020																												
Professional Project Development Diploma in Industrial	CCE2060		x	x	x		x		x		x			x		x		x		x	x	x	x
Experience Advanced Networking and	CCE3200		x	x	x		x	x		x	x			x		x	x		x	x		x	x
Security	CCE3040	x	x	x		x				x		x	x	x	x			x	x		x	x	x	x

Module	Code																							
Individual Computer Communications Project	CCE3050				x		x		x	x	x	x	x	x			x		x		x	x	x	x	x
Option 1: Network Analysis and Troubleshooting	CCE3060	x	x						x		x				x			x	x	x	x			
Option 2: Network Management	CCE3070	x	x	x	x	x	x					x			x					x	x			
Option 3: Wireless LANs and Mobile Computing	CCE3080	x	x					x	x		x		x	x	x	x		x	x	x	x			
Option 4: Distributed Systems	CCE3100	x	x	x				x		x	x		x		x	x			x	x	x			