

Programme Specification and Curriculum Map for MSc Computer Networks

1. Programme title	MSc Computer Networks
2. Awarding institution	Middlesex University
3. Teaching institution	Middlesex University
4. Programme accredited by	NA
5. Final qualification	MSc
6. Academic year	2009/2010
7. Language of study	English
8. Mode of study	Full Time & Part Time

9. Criteria for admission to the programme

Applicants should normally have one of the following:

A minimum of lower second Honours degree in science, computing or engineering or a degree deemed by the University to be equivalent

A professional qualification deemed to be of an equivalent standard

Relevant work experience of at least 5 years.

International students whose first language is not English or who have not been taught in the English medium throughout, and whose first degree is not from a British university, must achieve an IELTS score of 6.5 or TOEFL 575 (paper based) 233 (computer based).

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

10. Aims of the programme

The programme aims to provide the students with:

- A rigorous theoretical knowledge and understanding of current research issues as well as detailed practical experience of network design, development, implementation, operations, applications, systems and services. Skills that will enable students to contribute to future developments in the field of Network design and implementation.
- The ability to make a critical evaluation of the theories, techniques and systems used in planning, design, implementation, security and disaster recovery of modern communication networks as well as the services they support.
- Skills required in developing research as well problem-solving techniques through practical project experience. By extending students knowledge and skills in a specialized area they will be prepared for careers in advanced research and/or industry

The ability to involve both management and user in the process of awareness, decision and implementation with regard to computer Networks as well as evaluating the security risks.

The ability to evaluate the performance of wired and wireless computer networks using analytical and/or simulation tools and manage the implementation of a complete communication design project.

- Knowledge and understanding of the legal, social, ethical and professional issues related to network design and development.

11. Programme outcomes

A. Computing-related cognitive abilities

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

1. critically evaluate the communication needs of an organisation and apply both formal and informal methods to the design of a computer network to meet the requirement specification
2. Understand, design and evaluate the performance of a communication network using modelling and simulation techniques
3. apply network management concepts to real world systems
4. analyse and formulate solutions to the security threats of complex distributed networks
5. Provide a critical analysis and understanding of key concepts in the operation and deployment of network systems and services.
6. understand and use advanced routing protocols and route optimization techniques
7. Critically evaluate the legal, social, ethical and professional implications of network design and development in general and in specific context.
8. use a combination of general and specialist computer communications knowledge and understanding to apply an existing or emerging technology to the solution of a practical problem through the completion of an individual project

Teaching/learning methods

Students learn knowledge, gain understanding and develop cognitive skills and abilities through self directed study, resource based learning, small group discussions, small group and individual exercises, laboratory sessions, demonstration software, on-line examples and research project. Weekly seminar sessions that provide students with the opportunity to address questions, queries and problems.

- traditional lecture delivery (outcomes 1-7),
- group and individual research, presentations and written reports (outcomes 1-8),
- laboratory sessions (outcome 2, 5 & 6),
- individual and group design work (outcomes 3, 4, 5, and 8),
- Individual project. Throughout the students are encouraged to undertake independent reading both to supplement and consolidate what is being taught/learned and to broaden their individual knowledge and understanding of the subject (outcomes 1-8).

Assessment

Group and individual coursework, presentations, group and individual reports, and the unseen examination and the project thesis assess students' knowledge and understanding.

- Outcomes 1-7 assessed by examination.

	<ul style="list-style-type: none"> • Outcomes 2,5 and 6 are assessed by laboratory sessions and practical assignments • Outcome 1-8 is assessed by individual essay and final project thesis.
<p>B. Computing-related practical abilities On completion of this programme the successful student will be able to</p> <ol style="list-style-type: none"> 1. Design, implement and configure computer networks 2. Draw up system level agreements for computer networks 3 Critically evaluate computer communication system performance and recommend improvements supported with evidence/arguments 4 Simulate an existing/proposed computer communication system and propose improvements 5 Design and build usable computer communication systems using a methodological approach 6 Develop security plans and policies and deploy appropriate safeguards for networked systems. 	<p>Teaching/learning methods Students gain practical skills through</p> <ul style="list-style-type: none"> • group and individual research, presentations and written reports (outcomes 1-6)), • small group and individual exercises (outcomes 1-6), • laboratory sessions (outcome 1, 4-5), • Individual project (outcomes 1-6: depending on project title). <p>Analysis, design and problem solving skills are further developed through various design activities as well as case studies, and extensive computer laboratory sessions. Feedback is given to students on all assessed coursework as well as written exams (in the form of exam reports produced each term).</p> <p>Assessment Students' practical abilities are assessed through</p> <ul style="list-style-type: none"> • group and individual coursework (outcomes 1-6) • laboratory tests (outcome 1, 4-5), • the unseen examination (outcomes 1-6), and • the project thesis (outcomes 1-6 depending on project title).
<p>C. Additional Transferable Skills On completion of this programme the successful student will be able to</p> <ol style="list-style-type: none"> 1. Understand and apply mathematical techniques in relevant context. 2. analyse a problem systematically and implement an effective solution both individually and within a group 3. Communicate effectively (in writing, verbally and through graphical notations) 4. Effectively manage resources and time 	<p>Teaching/learning methods Students gain transferable skills through the teaching and learning programme outlined above. These skills are also nurtured through</p> <ul style="list-style-type: none"> • small group and individual presentations and exercises (outcome 3-8), • laboratory sessions (outcomes 1, 4, and 7) • the individual project (outcomes 1-8)

<ol style="list-style-type: none"> 5. Learn independently in familiar and unfamiliar situations with open-mindedness and in the spirit of critical enquiry 6. Learn effectively for the purpose of continuing professional development in a wider context throughout their career 7. Take personal responsibility for a range of activities and make decisions within an individual or group task context. 8. Understand the legal, social, ethical and professional issues related to network design and development. 	<p>Assessment Students' transferable skills are generally assessed through coursework reports and the thesis report</p> <ul style="list-style-type: none"> • Skills 1-8 are assessed through coursework and written exam (seminars) • Skills 2-4 and 7 are assessed by laboratory sessions.
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12. Programme structure (levels, modules, credits and progression requirements)

12.1 Overall structure of the programme

The programme is designed as a full-time course including industrial placement where applicable, or as a part-time programme. The normal University year is split into two terms of approximately 15 weeks each and students can start the programme in either Autumn term (September) or winter term (Late January/February).

The programme conforms to the requirements of the New Academic Learning Framework (NLF) of Middlesex University and comprises four taught modules (each worth 30cps) and a final project module (worth 60cps). Each 30cps module involves approximately 180 hours of study. This includes attendance at lectures, tutorials, laboratory activities and study at home or in industry. All modules on the programme are compulsory.

1. Full-time students joining the programme in September pursue the following study schedule (see page 13 below):
 - ❖ Two modules (totalling 60cps) in the Autumn term
 - ❖ Two modules (totalling 60cps) in the Winter Term
 - ❖ Undertake the postgraduate project module (60cp) in the Summer Term

Students who enrol in September may be able to complete their project over the following Spring, thereby completing the programme in one year.

2. Full-time students joining the programme in January pursue the following study schedule (see page 14 below):
 - ❖ Two modules (totalling 60cps) in the Winter Term
 - ❖ Two modules (totalling 60cps) in the Spring Term
 - ❖ Undertake the postgraduate project module (60cp) in the Spring Term

Students who enrol in January may be able to complete their project over the following Autumn, thereby completing the programme in one year.

3. Part-time students joining the programme in September pursue the following study schedule (see page 15 below):
 - ❖ One module (30cps) in the Autumn Term of the 1st year
 - ❖ One module (30cps) in the Winter Term of the 1st year
 - ❖ One module (30cps) in the Autumn Term of the 2nd year
 - ❖ One module (30cps) in the Winter Term of the 2nd year
 - ❖ Undertake the postgraduate project module (60cp) in the Spring and Autumn Terms of the 2nd year
4. Part-time students joining the programme in January pursue the following study schedule (see page 16 below):
 - ❖ One module (30cps) in the Winter Term of the 1st year
 - ❖ One module (30cps) in the Spring Term of the 1st year
 - ❖ One module (30cps) in the Autumn Term of the 2nd year
 - ❖ One module (30cps) in the Winter Term of the 2nd year
 - ❖ Undertake the postgraduate project module (60cp) in the Spring and Autumn Terms of the 2nd year

The duration of postgraduate project is one term for full-time and two terms for part-time students.

The general teaching and learning strategy is a lecture programme, with a module handbook, handouts and tutorial material supported by seminar sessions and practical laboratory activities and extended exercises for private study.

Projects should be appropriate to the Programme studied (i.e. Computer Networks) and supervised accordingly. All project proposals must be approved by the Programme Leader or a member of the academic team delegated by him/her.

Details of each module can be found on MISIS or in the Engineering and Information Systems Subject Handbook.

MSc Computer Networks – Full Time Mode

Programme Diagram

September 2009 Start

**Autumn Term
(AT)**

CCM4300
Computer Networks,
Wireless and Mobile
Communication
System

Exam WT

CCM4310
Network Design,
Modelling and
Simulation

Exam WT

Key

compulsory

**Winter Term
(WT)**

CCM4320
Network Systems
and Services

Exam WT

CCM4330
Network Security:
Protocols and
standards

Exam WT

Spring Term

CCM4900
Postgraduate
Project in
Computer
Communication

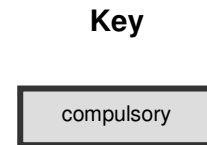
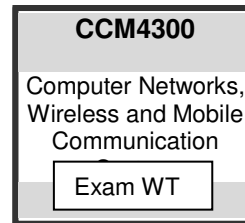
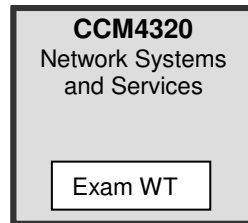
100% Cwk

MSc Computer Networks – Full Time Mode

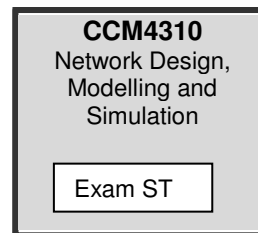
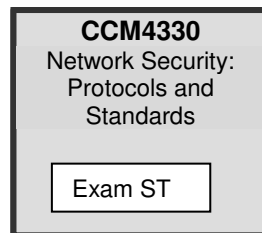
Programme Diagram

January 2010 Start

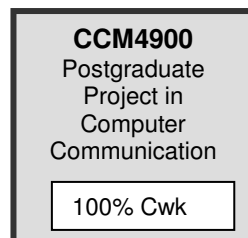
Winter Term
(WT)



Spring Term
(ST)



Autumn Term



MSc Computer Networks – Part Time Mode

Programme Diagram

September Start
Year 1
Autumn (AT)

CCM4300
Computer Networks,
Wireless and Mobile
Communication System

Exam WT

Key

compulsory

Year 1
Winter Term (WT)

CCM4320
Network Systems and
Services

Exam WT

Year 2
Autumn (AT)

CCM4310
Network Design
Modelling and
Simulation

Exam WT

Year 2
**Spring and
Autumn Terms**

CCM4900
Postgraduate Project in
Computer
Communication

100% Cwk

Year 2
**Winter Term
(WT)**

CCM4330
Network Security:
Protocols and standards

Exam WT

Programme Diagram

MSc Computer Networks – Part Time Mode

Key

January Start
Year 1
Winter Term
(WT)

CCM4320
Network Systems and Services

Exam WT

compulsory

Year 1
Spring Term (ST)

CCM4300
Computer Networks,
Wireless and Mobile
Communication
System

Exam ST

Year 2
Autumn Term
(AT)

CCM4310
Network Design
Modelling and
Simulation

Exam WT

Year 2
**Spring and
Autumn Terms**

CCM4900
Postgraduate Project in
Computer
Communication

Year 2
Winter Term
(WT)

CCM4330
Network Security:
Protocols and
standards

Exam WT

100% Cwk

12.2 Levels and modules

Level 4

COMPULSORY ¹	CREDIT POINTS	OPTIONAL ²	PROGRESSION REQUIREMENTS
CCM4300 Computer Networks, Wireless and Mobile Communication System	30	NONE	To pass a module, students must pass all components of assessment (i.e. exam and coursework)
CCM4310 Network Design, Modelling and Simulation	30		
CCM4320 Network Systems and Services	30		
CCM4330 Network Security: Protocols and Standards	30		
CCM4900 Postgraduate Project in Computer Communications	60		

13. A curriculum map relating learning outcomes to modules

See Curriculum Map attached.

¹ Compulsory modules are those that must be taken; that is, the qualification cannot be made unless these modules have been successfully completed. Each of these modules makes a unique contribution to the learning objectives of the programme or subject major/minor.

² Optional modules are modules that may be taken at the discretion of the student. It is not necessary to complete optional modules to achieve the award (assuming other awarding conditions are met). Optional modules make a non-unique contribution to the achievement of the learning objectives of the programme or subject major/minor.

Curriculum map for MSc Computer Networks

The first table below shows the modules in which the main measurable learning outcomes of the programme are taught and assessed. The second table shows the main measurable outcomes.

Module	Code	A 1	A 2	A 3	A 4	A 5	A 6	A 7	A 8	B 1	B 2	B 3	B 4	B 5	B 6	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8
Network Design, Modelling and Simulation	CCM4310	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>
Network Systems and Services	CCM4320			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>
Network Security: Protocols and Standards	CCM4330	<input type="checkbox"/>		<input type="checkbox"/>				<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>
Computer Networks, Wireless and Mobile Communication System	CCM4300	<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>							
Postgraduate Project in Computer Communication	CCM4900							<input type="checkbox"/>	<input type="checkbox"/>							<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Assessment Schedule for MSc Computer Networks

Module Number	Learning Week																								Exam
	1 28 Sep	2 05 Oct	3 12 Oct	4 19 Oct	5 26 Oct	6 02 Nov	7 09 Nov	8 16 Nov	9 23 Nov	10 30 Nov	11 07 Dec	12 14 Dec	13 11 Jan	14 18 Jan	15 25 Jan	16 01 Feb	17 08 Feb	18 15 Feb	19 22 Feb	20 01 Mar	21 08 Mar	22 15 Mar	23 22 Mar	24 12 Apr	24 Apr to 7 May
CCM4300																									
CCM4310			FI	SI		FI		SI		SI	SI	SI	SI												
CCM4900																									

Key

FI= Formative Individual Coursework

FG = Formative Group Coursework

P= Presentation

SI Summative Individual Coursework

SG Summative Group Coursework

14. Information about assessment regulations

Compulsory modules are those that must be taken; that is, the qualification cannot be made unless these modules have been successfully completed. Each of these modules makes a unique contribution to the learning objectives of the programme or subject major/minor.

¹ Optional modules are modules that may be taken at the discretion of the student. It is not necessary to complete optional modules to achieve the award (assuming other awarding conditions are met). Optional modules make a non-unique contribution to the achievement of the learning objectives of the programme or subject major/minor.

- 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/.
- Modules are assessed in accordance with the School of Engineering and Information Sciences's assessment strategy. Most modules adhere to a standard pattern of final grades being made up of 70% from examination and 30% coursework. Different patterns are permitted if approved by the School Academic Planning Committee.
- Practical aspects of the programme are often assessed via coursework that may be carried out using specialist software and may include lab tests.
- Theoretical material is normally assessed by coursework only at levels 0 and 1 and normally by a combination of both coursework and examination at levels 2, 3 and 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 assessed please refer to the individual module narratives for this programme.

15. Placement opportunities, requirements and support (if applicable)

- Industrial placement is an option available for students who wish to work in industry for a maximum period of 12 weeks. During this period students are expected to work on their project, part of which should be relevant to the company where the placement is arranged.
- Industrial placement is conditional on the successful completion of all taught modules. Therefore 120 credits at level four need to be successfully completed before embarking on an industrial placement.
- The campus Placement Office manages University-industry relations and assists students in obtaining industrial placements. Further information on placement opportunities can be obtained there. Students are visited by an academic from the programme team at least once.

Postgraduate placements are normally a student initiated process for which the University will provide support.

16. Future careers

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

- 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
- The majority of graduates are employed in IT posts relevant to the subject.
- Over 20% of students pursue further postgraduate study or research.
- The School has an Industrial Advisory Group which meets to advise and inform the School.

The employer links with the School are encouraged and take part in a number of ways: 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 alumni both in the UK and overseas.

17. Particular support for learning

The School's Teaching and Learning Strategy is compliant with that of the University; it aims to develop learner autonomy and to encourage resource-based learning.

In support of the student 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 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 (electronic copies for all students can also be found at <http://www.mdx.ac.uk/24-7/cs/#subjecthandbook>). If you require a hard copy of this Subject Handbook please request them from the School of Engineering and Information Sciences Academic Advice office at Hendon.
- Each term new and existing students are given module handbooks for each module they study. Soft copies of all module handbooks on a CD will also be provided to students at enrolment. Web-based learning materials are provided to further support learning
- Extensive library facilities are available on all campuses. WebCT pages are available as learning resources through the Oasis system.
- Campus Student Offices offer advice and support to students through their Student Advice Centres.
- A Dean of Students for general academic advice is available on each campus.
- Placements are supported by campus Student Offices and School academics; please refer to section 19 of this programme specification.
- High quality specialist laboratories equipped with industry-standard software and hardware are available for formal teaching and personal study.
- To provide assistance and guidance in support of particular learning needs, campus-based, drop-in sessions are arranged by the School as needed.
- School Academic Advisors for each subject are available to offer personal academic advice and help. Rotas for the operation of Academic Advice Rooms at each campus can be found at <http://www.mdx.ac.uk/24-7/cs/index.htm#tutor>
- Tutorial sessions for each module, organised for groups of up to 20 students, are provided for additional teaching support.
- 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 and at <http://www.mdx.ac.uk/24-7/cs/index.htm>
- In undergraduate programmes students can exercise choice and take responsibility for their particular learning: at level 1 (in the second term of study) an elective module can be taken from another subject; at levels 2 and 3 there are options for choosing specialist modules with some forming a pathway that forms part of the degree title.
- Research activities of academic staff feed into the teaching programme, which can provide individual students with ad hoc opportunities to work with academics on some aspect of research.

Middlesex University encourages and supports students with disabilities. Some practical aspects of Engineering and Information Systems programmes may present challenges to students with particular disabilities. You are encouraged to visit our campuses at any time to evaluate facilities and talk in confidence about your needs. If we know your individual needs we'll be able to provide for them more easily. For further information contact the Disability Support Service (email: disability@mdx.ac.uk).

18. JACS code (or other relevant coding system)	G420
19. Relevant QAA subject benchmark group(s)	Computing

20. Reference points	
The following reference points were used in designing and reviewing the programme:	
<ul style="list-style-type: none"> • QAA Framework for Higher Education Qualification in England, Wales and Northern Ireland • QAA Computing subject benchmarks • QAA/QAAS guidelines for programme specification • QAA Code of Practice for the assurance of academic quality and standards in HE • University' Policy, Regulations and guidelines • British Computer Society (BCS) Guidelines for Exemption and Accreditation • Module Narratives • Middlesex University and School of Engineering and Information Sciences Teaching Learning and Assessment policies and strategies • University policy on equal opportunities 	

21. Other information	
<p>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/ or contact Elli Georgiadou, the School of Engineering and Information Sciences coordinator of European Affairs & International Exchanges (email: e.georgiadou@mdx.ac.uk).</p>	

Please note programme specifications provide a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve if s/he takes full advantage of the learning opportunities that are provided. More detailed information about the programme can be found in the student programme handbook and the University Regulations.